The Modern Teachers' Series

EDITED BY WILLIAM C. BAGLEY

THE PROJECT METHOD OF TEACHING

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THE PROJECT METHOD OF TEACHING

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THIS BOOK IS DEDICATED

TO MY WIFE

JOSEPHINE REESE STEVENSON

PREFACE

This book is devoted mainly to a critical discussion of the project method of teaching. The term "project" has only recently made its appearance in educational terminology, but the idea back of the project is not new. It is quite probable that skillful teachers have always used the essential features of the project method.

A survey of modern teaching methods in engineering, law, medicine, agriculture, as well as in the prescribed subjects of the school curriculum, shows that much effort is being expended to bridge the chasm between school tasks and activities outside the school. In other words, the project idea, as defined by the author, is attempted to some extent in all these fields.

The project idea aims to present problems in situations not essentially different from those of life and to develop the technique of carrying the solution of these problems to completion.

While the primary purpose of this study is to define the project and to discuss the project method from a critical point of view, it has seemed advisable, since method is so closely tied up with curriculum organization, to discuss the reorganization of the curriculum on the project basis. Also, the history of the project has been considered in some detail, since a knowledge

of the historical background is essential to a proper understanding of the term.

The first seven chapters deal with the theory of the project method. In chapter eight, projects which have been successfully worked out in elementary and high schools are outlined in order to show the application of this method of teaching. No attempt has been made, however, to organize any one subject completely on the project basis.

The author realizes the difficulty of organizing a course completely on the project basis. But, wherever it is possible to substitute units of work on the project basis for work on a subject basis, results will show the effectiveness of the project method.

The author recognizes his very great indebtedness to his former teacher and colleague, Professor W. W. Charters, who was responsible for his interest in this subject. The idea of the "project," as defined in this study, was proposed by Professor Charters, and his suggestions have served as a guide in the working out of the "project method."

J. A. S.

Pittsburgh, Pennsylvania,
August, 1920

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EDITOR'S INTRODUCTION

Teachers of educational theory are frequently asked whether the "project method" is something new or whether it is merely a new name for a type of teaching that has long been known and practiced.

It may seem paradoxical to say that both these apparent alternatives are true. There is, I am confident, something essentially new in the project method as it has been formulated by such men as Charters, Stevenson, Snedden, and Kilpatrick. This new something, however, is itself a product of an evolution, and it should go without saying that the method was practiced and even described long before it was christened. To go no farther back than the second quarter of the nineteenth century, one may find in Thoreau's *Walden* a criticism of traditional educational practices which expresses very clearly some of the ideals that the project method strives to realize:

" . . . 'But,' says one, 'you do not mean that the students should go to work with their hands instead of their heads?' I do not mean that exactly. . . . I mean that they should not *play* life, or *study* it merely, . . . but earnestly *live* it. . . . How could youths better learn to live than by at once trying the experiment of living? Methinks this would exercise their

minds as much as mathematics. If I wished a boy to know something about the arts and sciences, for instance, I would not pursue the common course, which is merely to send him into the neighborhood of some professor, where everything is professed and practiced but the art of life; — to survey the world through a telescope or a microscope, and never with his natural eye; to study chemistry, and not learn how his bread is made, or mechanics, and not learn how it is earned; to discover new satellites in Neptune, and not detect the motes in his eyes, or to what vagabond he is a satellite; or to be devoured by the monsters all around him, while contemplating the monsters in a drop of vinegar. Which would have advanced the most at the end of the month, — the boy who had made his own jackknife from the ore which he had dug and smelted, reading as much as would be necessary for this, — or the boy who had attended the lectures on metallurgy at the Institute in the meanwhile, and had received a Rogers' penknife from his father? . . . To my astonishment I was informed on leaving college that I had studied navigation! — why, if I had taken one turn down the harbor I should have known more about it. . . ."[1]

Certainly there is no problem more fundamental or more perplexing than that which is involved in the effort to link what we call knowledge with the larger

[1] This interesting commentary on teaching will be found in "Economy," the first essay in *Walden*.

complex that we call life. To bring knowledge to the learner in the "natural setting" of a problem that the knowledge will help to solve ought to effect this end if any educational procedure can effect it. That the project method as thus conceived has its limitations is obvious enough. Even Thoreau might have found himself hard put to it to provide all the "natural settings" needed to impel the boy to make his own jack-knife "from the ore which he had dug and smelted, reading as much as would be necessary for this"; and it is tolerably clear, too, that Thoreau in his student days could have taken more than "one turn down the harbor" without learning even the little about navigation that his college course in that subject taught him. The layman's easy solutions for educational problems frequently involve a quite innocent disregard of practical obstacles. If some of our educational problems were so easy to dispose of as they may seem to be on the surface, it is safe to assume that they would not have remained so long unsolved.

Dr. Stevenson's treatment of the project method recognizes the difficulties which an effort to reorganize educational practice on the basis of "real problems" must meet and overcome. If it is true that the author has an abundant faith in the method, it is also true that he recognizes its limitations and its possible dangers. His attitude is that of the student who accepts a theory as inherently valid and then asks how the theory may be so applied that its virtues will be re-

flected in the practice. It avails us little to say of a proposal, "It is all right in theory, but it won't work." If a proposal is theoretically right it will "work," else the validity of the theory is questionable. The project method as defined by Dr. Stevenson represents a clear-cut theory of teaching. It merits careful study and a thoroughgoing test. Even if it does not prove to be a universal solvent for the great problem of bringing knowledge close to life, it is altogether probable that its formulation is a step forward — perhaps a longer and a more important step than has heretofore been taken in the development of educational method.

William C. Bagley.

THE PROJECT METHOD OF TEACHING

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CHAPTER I

GENERAL STATEMENT OF PROBLEM AND METHOD OF INVESTIGATION

I. Introduction

A survey of the literature dealing particularly with agricultural education, the teaching of home economics and of the trades and industries, and, more recently, with the administration of the Smith-Hughes Act, is sufficient to show that the term "project" has a wide use. Nor has the term been confined to the subjects cited, although it appears more frequently there than elsewhere.

Coincident with its use in these fields has appeared a considerable and somewhat critical discussion of its meaning and implications, a discussion which has revealed a disconcerting variety of opinion. There are in existence approximately twenty definitions or descriptions of the project, discussed by fifteen writers. The results have indicated widespread interest, but have not suggested any striking agreement or uniformity of view.

This lack of uniformity, typical of project literature, has been commented upon by writers on the project method. Four years ago, H. P. Barrows, among others, pointed out the fact that "in many sections where teachers talk of projects there seems to be a lack of understanding of the plan and a lack of unity in the definition of the term. According to some teachers any effort toward giving their work a practical turn is termed a project. Others have used the word in lieu of 'practicum,' so that simple laboratory exercises are spoken of as projects." [1]

This vague use of the term, together with the diverse attempts to define or enumerate its essential characteristics, and the well-known tendency of educational writers to invent unnecessary terms, may properly give rise to the question as to whether the project really implies the introduction of a new concept. A critic objecting to the introduction of new terms might very pertinently ask whether the different meanings attached to the word might not be forms of other concepts now in use which would serve just as well as a new coinage.

II. The Elements in the Problem

A solution of the problem just stated will be attempted in this book. There are many incidental inquiries which will demand solution, but the present

[1] Barrows, H. P., "Home Projects in Secondary Courses in Agriculture," U. S. Department of Agriculture, States Relations Service Bulletin No. 346, p. 4, Feb. 21, 1916.

study will be devoted mainly to the investigation and solution of the following general divisions of the problem:

A. The determination of certain elements that make a certain teaching situation a project. These will be treated as four pairs of contrasted aims in learning.

B. An examination of concepts now in use and more or less closely related to the project for the purpose of estimating their availability for describing the teaching situation indicated in the first investigation.

C. A statement and explanation of the term "project."

D. A critical examination of all extant definitions of the term.

E. A consideration of the significance of the project in relation to problem, motive, reasoning, drill, and the curriculum.

F. An examination of the ideas contained in the term, but under different names, in the teaching of law, medicine, engineering, journalism, and the foreign languages.

III. Standards of Judgment

The most lucid method of showing what is essential to the project as a method of teaching is found in an analysis of four characteristics that seem to be involved in the idea. As a device to aid in the analysis it has been found convenient to set forth four pairs of aims in teaching and to demonstrate, on the one hand, that

the project includes one item from each of these pairs, and on the other, that no other concept in common use, such as problem, exercise, practicum, precisely covers this situation. These four pairs of aims are:

(*a*) Reasoning *vs.* memory of information.

(*b*) Conduct *vs.* information for its own sake.

(*c*) Natural setting for learning *vs.* artificial setting for learning.

(*d*) The priority of the problem *vs.* the priority of principles.

It will be shown that the project, as herein defined, involves one item from each of these pairs, viz.: reasoning, conduct, natural setting, and priority of the problem. It will be further shown that all other terms in common use include less or more than these four items.

(a) *Memory of Information* vs. *Reasoning*

Two widely different methods of learning have been and are still used in educational practice.

The first measures its worth by the learner's success in absorbing the material in the textbook so as to make a letter-perfect recitation when called upon by the teacher. This method may be termed the acquisition of information by memory. The material in the lessons consists in a great measure of dogmatic statements, and the mental activity demanded of the pupil is reduced largely to reproductive memory. The mental act

demanded of pupils in such exercises does not constitute reasoning, but is little more than the assimilation of statements outlined and organized by the author. This fact is clearly shown by the survey of textbooks used by children in the grades and in the high school, from one of which the following illustration is taken:

"Surface and Industry. Paraguay is a rich but undeveloped country largely occupied by Indian negro races. The surface is made up of plains and low mountains covered by forests. The plains are chiefly devoted to grazing and the production of Paraguay tea, or mate.

"Trade. Paraguay tea is cheaper than Asiatic tea and its use in South America is constantly increasing. Lumber is the principal forest product, and is sent to the Argentine Republic and Uruguay, both of which lack timber. These products, together with hides and tobacco, are the chief exports. The leading imports are textiles, provisions, hardware, and drugs.

"Asuncion, the capital, from its position on the Paraguay River, is the most flourishing town and commercial port.

Questions and Exercises

"(1) What is the chief article of trade between Paraguay and the neighboring countries?

"(2) What does Paraguay import from the Argentine Republic?

"(3) Give the chief advantages of the location of Asuncion."[1]

[1] Dodge, R. E., "Advanced Geography," pp. 210–211. Rand, McNally and Company, Chicago, 1914.

The activity which the learner uses in answering these questions is largely confined to memory. The answers to questions (1) and (3) are found in the descriptive paragraph; the answer to question (2) is found in the preceding paragraph describing the Argentine Republic and not quoted here.

The recognition of the inadequacy of memorizing information is not recent. Seventy years ago, Horace Mann, in his annual report for 1845, pointed out what earlier writers had sensed, that verbal memory received too much attention: "The teacher may appear to do a vast deal more by stimulating the verbal memory of the child, and by giving him the show instead of the substance of knowledge, than if he could strive to reanimate the apparently dead powers of acquisition and of thought. Yet the latter should be done, at whatever seeming delay; and the faithful teacher will do it irrespective of the consequences of it to his own reputation."[1] And again he asserts that "a habit, too, is . . . formed of reciting, without thinking. At length the most glib recitation becomes the best; and the less the scholars are delayed by thought, the faster they can prate, as a mill clacks quicker when there is no grist in the hopper."[2]

Another statement from Mann, quoted because of

[1] "Life and Works of Horace Mann," Vol. 4, p. 81, Reports and Addresses. Lee and Shepard, Publishers.

[2] *Ibid.*, Vol. 2, p. 69, Lectures and Reports. Lee and Shepard, Publishers.

its humor, illustrates an extreme case of memoriter teaching:

"It recently happened, in a school within my own knowledge, that a class of small scholars in geography, on being examined respecting the natural divisions of the earth, its continents, oceans, islands, gulfs, etc., answered all the questions with admirable precision and promptness. They were then asked, by a visitor, some general questions respecting their lesson, amongst others, whether they had ever seen the earth about which they had been reading; and they unanimously declared in good faith that they never had." [1]

As the quotations indicate, the defect of the memory exercises in developing reasoning was noted early, and out of the correctives, suggested by Mann and others, for developing the reasoning, have grown the concepts of the rational method, thought questions, and later the more elaborate form now known as the problem method.

The problem method, as described by John Dewey and others, has found its psychological justification in the functional character of thinking. The origin of thinking, in Dewey's judgment, lies in a problem to be solved:

"To say that thinking occurs with reference to situations which are still going on, and incomplete, is to say that thinking occurs when things are uncertain

[1] "Life and Works of Horace Mann," Vol. 2, p. 68, Lectures and Reports.

or doubtful or problematic. Only what is finished, completed, is wholly assured. Where there is reflection there is suspense. The object of thinking is to help reach a conclusion, to project a possible termination on the basis of what is already given. Certain other facts about thinking accompany this feature. Since the situation in which thinking occurs is a doubtful one, thinking is a process of inquiry, of looking into things, of investigating." [1]

In other words, "It is the problematic situation in which thinking or reasoning has its rise."

The importance of the problem in developing reason is also indicated by E. N. Henderson:

"The use of the problem as the form of educating the reason has been especially characteristic of education in modern time. It may be said to be the largest outcome of educational reform in the direction of method, and its advent means the conscious endeavor to give the child not merely the fixed adjustments of recapitulatory education, but also the capacity to readjust that springs from reason and its culture. In general, the educational principle that has been put forward as representing the issue is that learning should stir up the self-activity of the child, that the child should learn from his own experience and efforts, not from those of the teacher; in other words, that the most effective teaching is self-teaching." [2]

[1] Dewey, John, "Democracy and Education," p. 173. The Macmillan Company, 1916.

[2] Henderson, E. N., "The Principles of Education," p. 273. The Macmillan Company, 1910.

The most important advantages claimed for the problem method are that it gives a better hold on subject matter and develops a technique of reasoning.

For our purposes, an analysis of concepts now in use which may be more or less related to the project, must be made in order to distinguish between these two educational tendencies, viz.: the mastery of information through mere memory and its acquisition through reasoning. The kind of teaching that includes provisions and opportunities for reasoning, that makes use of the problem and lays particular emphasis on it, as against the kind of teaching that emphasizes merely memorized information, is worthy of consideration as a standard by which to evaluate commonly used concepts more or less related to the project.

(b) *Conduct* vs. *Information for Its Own Sake*

It is also necessary to distinguish between the completion of an act (conduct) as contrasted with reading about and learning the plan of an act (information).

Conduct as characterized by John Dewey is "a general term for the spirit and tenor of all the overt acts that constitute the behavior of an agent. As contrasted with the term 'behavior,' the word 'conduct' is usually limited to acts that have an end consciously in view and that are preceded by more or less deliberation — in short, to such acts as have moral quality, actual or potential." [1]

[1] Dewey, John, "Conduct." Monroe's Cyclopedia of Education.

The implied question which it is necessary to consider in the discussion of these two contrasted aims of learning is the character of the end of education. Is it the accumulation of information or the modification of conduct?

Educational writers agree that information for its own sake is not a satisfactory end of education. For example, F. M. McMurry says:

"Much has been said in times past about art for art's sake, science for the sake of science, and knowledge for the sake of knowledge; but these are vague expressions that will excite little interest so long as the worth of a man is determined by what comes out of him, by the service he renders, rather than by what enters in. Other branches of knowledge used for educative purposes, therefore, resemble the useful arts in the recognition of their bearings on man, their actual use as the goal in their study." [1]

Other educational writers agree that conduct is a worthy or satisfactory end of education. For instance, Dewey says: "It [education] is that reconstruction or reorganization of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent experience." And Bagley adds: "Education may be tentatively defined, then, as the process by means of which the individual acquires experiences that will function in rendering more efficient his future action." [2]

[1] McMurry, F. M., "How to Study," p. 198. Houghton Mifflin Company, 1909.

[2] Bagley, W. C., "The Educative Process, p. 22. The Macmillan Company, 1905.

The following quotation from E. C. Moore is also significant:

"Learning to use one's own mind, however, in such ways that he will go on using it to advantage as long as he lives is the one, great, supreme object of education. Now that psychology has defined itself as the study of behavior, education must follow suit by conceiving its mission as that of training the student to profitable behavior, that is, to do the things that the situations which he will meet in life call for. Our contention is that these social doings are definite responses to concrete situations, and that the learning which will fit us to make them must be the learning of definite doings, not that vague thing which is called general training." [1]

Classroom teachers and textbook writers, when faced by the direct question as to the end of education, agree so unanimously with the statement that the end of education should be the modification of conduct, that no notice would need to be taken of any divergent view, were it not for the fact that actual classroom procedure through questions, recitations, reviews, and examinations is frequently dominated by the other ideal, that the mastery of information, and not its applications to problems of conduct, is the important end of education. In fact, this conflict is so real that many of the commonly used concepts enumerated below [2] have been invented for the specific purpose

[1] Moore, E. C., "What is Education?" pp. 235–236. Ginn and Company, 1915.
[2] See p. 22.

of insuring mastery of information rather than improvement of conduct.

It must be recognized, of course, that information does tend to modify conduct. This modification, however, is not automatic; it is to a very considerable degree both voluntary and conscious. It requires thought to apply information to conduct, and this application has so subtle a technique that instruction in the applications of information is necessary, as is very clearly brought out by E. C. Moore in the following serio-comic paragraph:

"Should verbal study be allowed to take the place of doing? Suppose the master workman in the shop, which is the world, should say to his apprentices: 'It is true that you have come here to learn how to use the best of these tools in the working of iron, but that is a tedious and illiberal process. It will be more profitable to you if I should tell you some of the more important facts about them, and then we will spend the remainder of the time that you are to be here in analyzing the language which I shall have been compelled to employ in describing them to you. After all, language is the most important of human concerns. Some say it is a tool just like all these others here, but I think it is so much more than that that I am convinced that if you will only take the trouble, not indeed to learn to use it — for that is the least important thing about it — but to learn all the curious facts and distinctions that subtle minds have found out about it, and to recognize them when you meet instances of them, you will be better prepared to use both it and all these

other tools than any amount of working with them under my direction could make you.' "[1]

From the foregoing quotations it seems evident that the modification of conduct is a worthy end of education, at least, a more worthy end than that of information for its own sake. How, then, may provision be made for this essential element, the modification of conduct?

An act carried to completion guarantees that the solutions will be understood and will become the property of the individual who carries them out. Information will then be measured by the extent to which it can be made over into the experience of the individual using it to solve his problem. If the act is carried to completion a maximum modification of conduct will result. To the extent that the act remains incomplete, to that extent the individual has failed to exhaust the range of possible solutions and to remake more experience; and, by the same token, the less will conduct be affected. Conduct is modified by memoriter information but within very narrow limits, for the range of possible applications is reduced. Conduct is modified in proportion as the act is carried to completion.

A concept which includes provisions and opportunities for conduct, that is, for the carrying of acts to completion, and which lays particular emphasis on this feature, is worth consideration as a standard by

[1] Moore, E. C., "What is Education?" pp. 181–182.

which to evaluate commonly used concepts related to the project.

(c) *Natural Setting* vs. *Artificial Setting*

An attempt to answer the question, Is the problem in its natural or artificial setting? constitutes the basis for the discussion of the third pair of contrasted aims of teaching. Is the problem presented for solution by schoolroom practice essentially different from that found in life outside the school? If the solution is carried on in essentially the same way in school as outside of school then the problem has a "natural setting."

The boy in an agricultural school who determines to test his father's seed corn as a part of the assignment of the school work is carrying on the problem in a natural setting. The problems in mathematics that are solved in school with the same incentive and purpose that prompts their solution outside of school, are solved in their natural setting. The study of the gasoline engine in the physics class would be considered as a problem in its natural setting provided that the motives prompting the learning of the parts and the way to run the engine were not different from those that would dominate the same learning situation outside of the school. The reading of "Ivanhoe" in school would likewise be done in its natural setting if the motives prompting the reading were similar to those which would cause people outside the school to read the book.

In pursuing his work, the farmer makes plans to-day, purchases his seed and at the same time possibly gives attention to the buying of stock. Plans are made for sowing, harvesting, testing of the seed and the herd. Each day presents new problems which demand solution. They arise because there is a need present. The carrying on of his activities brings him face to face with difficulties, with situations which demand solution. These problems which he faces from day to day represent an ideal natural setting for the solution of difficulties.

When, however, the subject matter for the school course in agriculture is arranged, it is frequently found almost impossible to teach the whole range of activities that the farmer normally practices. Hence certain abstractions are made. Training may include courses in soil analysis, animal husbandry, and farm mechanics. Certain problems may be planned and carried out in each one of these subjects, but since some of the problems will not, or possibly may not, parallel any problem in practical life, it may be said that the setting of these problems is artificial.

The artificiality of the setting of many school problems is clearly characterized by John Dewey in the following statement:

"There can be no doubt that a peculiar artificiality attaches to much of what is learned in schools. It can hardly be said that many students consciously think of the subject matter as unreal; but it assuredly does

not possess for them the kind of reality which the subject matter of their vital experiences possesses. They learn not to expect that sort of reality of it; they become habituated to treating it as having reality for the purposes of recitations, lessons, and examinations. That it should remain inert for the experiences of daily life is more or less a matter of course. The bad effects are twofold. Ordinary experience does not receive the enrichment which it should; it is not fertilized by school learning. And the attitudes which spring from getting used to and accepting half-understood and ill-digested material weaken vigor and efficiency of thought. . . . Where schools are equipped with laboratories, shops, and gardens, where dramatizations, plays, and games are freely used, opportunities exist for reproducing situations of life, and for acquiring and applying information and ideas in the carrying forward of progressive experiences." [1]

Criticism that the subject matter of the school is still largely isolated from the experiences outside of the school is due largely to the fact that few provisions are made for carrying forward problems in the school in their natural setting.

The idea must be borne in mind as the discussion of natural and artificial setting proceeds that the elementary and high schools are not training scientists, writers of fiction, or philosophers, but people who constitute average folk. But if the pupils decide to become highly specialized experts, it may be that the problems which they then face will assume what in this discussion would

[1] Dewey, John, "Democracy and Education," p. 190.

seem to be an abstract and artificial setting. This seemingly abstract and artificial setting may be the natural setting for such problems.

Methods of teaching which lay stress, on the one hand, upon abstracted subject matter, and, on the other, upon the provision for, and the acceptance of, the natural setting of problems in the school, may rightfully be taken into consideration in the evaluation of commonly used concepts related to the project.

(d) *The Priority of the Problem* vs. *the Priority of Principles*

This statement indicates the differences in the order in which principles and problems are presented. In the first instance, the study of principles precedes their application to a problem; in the second case, the problem is staged for the learner and the principles are introduced as needed in the solution of the problem.

The differences between these two types of learning are commented upon by G. R. Twiss:

"As finding the place of a new fact or phenomenon in the general system is always the final step for the scientist in the treatment of a problem, so it should be for the student in the science class. Accordingly the logical position of a new fact should not be given by the teacher at the start, as so often it is, but should be found by the class after they have studied it." [1]

[1] Twiss, G. R., "Science Teaching," pp. 77–78. The Macmillan Company, 1917.

And again:

"This fundamental principle of science teaching, which withholds theories until they are needed to explain the facts, and allows them to be used only as working hypotheses until the accumulated evidence forces conviction, is flagrantly violated in some of the most widely used texts in both physics and chemistry. In one physics text the wave theory of light comes almost at the beginning of the subject, and the molecular theory is introduced before the phenomena of heat are taken up. In several of the chemistries the authors take the shortest possible cut to the atomic theory. The result is muddy and vague talk by the pupils about what molecules and ether do, when plain statements of fact are required. It leads them inevitably toward a dogmatic, deductive attitude; and it fails to train them in distinguishing between fact and inference — an ability that is absolutely essential to any clear and scientific thinking." [1]

The principles that are developed by the learner in situations in which he has had need for them will function in the real situations outside the classroom. If the definitions are given first and then illustrated there is still left a doubt in the pupil's mind as to whether or not the principles can be used by him in the solution of his problem. As Twiss says, "Real knowledge of a law or principle — that is, facility or skill in using it — can be gained only by practice in dealing with problematic situations in which it is involved." [2]

[1] Twiss, G. R., "Science Teaching," p. 309. [2] *Ibid.*, p. 291.

The advantages claimed for the priority of the problem as against the priority of principles may be summarized as follows:

(1) The principles will be better understood when they are developed as the learner has need for them.

(2) The principles learned in this way are acquired by the individual in the order in which they were acquired by the race. The formulation of the principles is the final process following observation and application. It does not come first.

(3) More interest attaches to the formulation of the principles when the use of the principle is known and appreciated.

The disadvantages of the procedure are that fewer principles may be given and that a systematic outlook may be more difficult to obtain. These objections will be considered later when the implications of the project method are under discussion.

A method of teaching which makes adequate provision for raising, first of all, problems in the mind of the learner, developing principles as needed in the solution of the problems, should be given consideration as a standard by which to evaluate concepts related to the project.

IV. The Problem Restated

Four pairs of standards have been mentioned: information acquired by reasoning *vs.* information acquired by memory, information for its use in modifying

conduct *vs.* information for its own sake, learning in a natural setting *vs.* learning in an artificial setting, and the setting of problems with the introduction of principles as needed in their solution *vs.* the study of principles before acquaintance with the problems in which they are useful.

It is evident that there may be an important type of teaching situation which would involve one of each of the four pairs. For instance, the student might have a situation in which he would attack a problem in its natural setting, obtain information by reasoning out his solution, use this information in actually modifying his conduct, and learn his facts and principles as the solution of his problem demanded. If so, there is a demand for a name for such a teaching situation, provided that no term now in use denotes these elements and provided that the situation is of sufficient educational importance to warrant the invention of a new term.

That such teaching situations are numerous is clearly shown by their constant recurrence in several fields of instruction.

Two situations will be mentioned here from different fields and other examples will be multiplied throughout the later discussions. The situation in agriculture is stated by R. W. Stimson.

"In the ordinary routine of the farm it may be that the boy is required to tend the poultry. During at least one year he should be given control of at least

one pen of poultry, and facilities for feeding a balanced ration and trap nesting individual birds for comparison of the productivity in laying." [1]

Another example is cited from household science. A student is required to assume responsibility for the purchase and preparation of the meals at home for a longer or shorter period with the understanding that they be well balanced.

The foregoing problems are types of situations not at all uncommon in many subjects, including the agricultural and household science courses, which involve (1) the standards of reasoning, (2) information acquired, as it is needed, for use in (3) carrying on a practical line of action in (4) its natural setting.

The next chapter will consider the recognized types of teaching to see if any, without modification, can take care of teaching situations that are similar to those just cited from the fields of agriculture and household science.

[1] Stimson, R. W., "The Massachusetts Home-Project Plan of Vocational Agricultural Education." U. S. Bureau of Education, Whole No. 579, p. 15, 1914.

CHAPTER II

AN EXAMINATION OF TYPES OF TEACHING NOW IN COMMON USE

I. The Types and the Method of Selection

Can the school activities included within the term "project" be taken care of by other concepts now in use? To answer this question it is necessary that the types of teaching which collectively include some of the most important phases of the project, be analyzed into their elements and their functions determined so as to compare them with the elements and functions for which the word "project" may be made to stand.

The most reliable source in which to find the concepts in common and accepted use is in contemporary elementary and high school textbooks. A careful examination of forty-two books, including texts in geography, language, science, reading, algebra, geometry, and Latin, disclosed fourteen methods of teaching found with sufficient frequency to warrant the statement that they comprise those now in most common use. The methods noted are: questions, topics, problems, examples, originals, exercises, drills, tests, reviews, applications, illustrations, demonstrations, experiments, and practicums.

These methods should be examined critically to see if any one is sufficiently inclusive and exclusive in its scope to provide for the situations cited above and illustrated by household science and agriculture. If all of the four desirable standards are not included or if other than the four standards are included, it will then be desirable to propose a new concept.

(a) *Questions*

Since the topical method of organization centers largely in questions, an illustration of the topic and the uses made of the four types of questions, the detailed, topical, memory, and thought questions, will be discussed. The topical treatment is taken from Redway and Hinman's *Natural School Geography*.

" The Northeastern Section

" The six states in the extreme northeastern part of our country are often called New England. The surface in general is hilly, while the northwestern part of the section is traversed by the northern ranges of the Appalachians. Of these the Green Mountains are the most continuous, and the White Mountains, east of Connecticut River, are the highest.

" The section is less suited to agriculture than any other part of the eastern lowlands. The valleys of the larger rivers are fertile, but over much of the uplands the soil is thin, unproductive, and covered with glacial bowlders. In the northern part are extensive forests. Such crops as hay, apples, potatoes, and tobacco are raised in the valleys. Market gardening

and dairying are carried on. The greater part of the food used by the people, however, comes from the west.

"The numerous waterfalls of this section afford excellent water power, and manufacturing has become the chief occupation. Steam power is now largely used, however, coal for fuel being brought chiefly by sea from the ports of Chesapeake and Delaware bays.

"The section produces practically no coal or raw materials other than stone and wood; hence the articles manufactured are those which have a high value in comparison with that of the fuel and material used.

"The chief manufactures are cotton and woolen cloth and boots and shoes, of which this section produces more than all the rest of the country. Other characteristic manufactures are brass goods, paper, wood pulp, light hardware, fine machinery, firearms, clothing, silk, jewelry, and rubber goods.

"Southern New England is the most densely peopled part of the United States. More than half the people there live in cities.

"To supply the needs of the dense manufacturing population, the southern half of the section is covered with a network of railways, which connects it with the south and west, and also with the railway systems of Canada. The glacier-carved fiords and bays of the New England coast contain many fine harbors, from which vessels carry on an active coasting or fishing trade; and Boston maintains a large foreign commerce." [1]

To illustrate the detailed memory and topical questions, and to show how closely they follow the text

[1] Redway and Hinman, "Natural School Geography," pp. 56, 57. American Book Company, New York

materials, a list is presented. These questions are typical of the questions which accompany the topical organization of the subject matter.

$$\left.\begin{array}{l}\text{(1) Detailed and}\\ \text{(2) Memory Questions}\end{array}\right\}\text{Small Problems}$$

(1) How many states are included in the Northeastern section?

(2) What is the character of the surface? Why?

(3) What mountain ranges traverse the Northwestern part of the section?

(4) What section is suited to agriculture? Why? What section is not? Why?

(5) What are the chief agricultural products?

(6) What is the chief occupation of the people of this section? Why?

(7) Why are the manufactured articles those which have a high value in comparison with the fuel and material used?

(8) Name the chief manufactured products.

(9) Why does this section have such a network of railroads?

(3) Topical Questions

(1) What are the surface characteristics of the Northeastern group of states? Why?

(2) What are the chief occupations of this section? Why?

In the topic taken from the geography there are

gathered certain facts which are presumably worth learning and which are presented in logical order. These facts are taught one by one and not in response to the needs of the learner.

The mental effort of the learner will probably be greater if the topical questions are used instead of the detailed questions. In either case the questions may be answered if the material in the paragraph is remembered.

As previously stated, the memory question is closely connected with the topical arrangement, which accounts for the topical arrangement just quoted and discussed later in the treatment of the topical method, and was brought into use first to insure the mastery of the subject matter as presented. This mastery depends upon the ability of the pupils to memorize and to give back the facts.

The question is one of the oldest devices used to develop some degree of reasoning on the part of the pupils. The lessons are assigned and the question is used not only to determine what the pupil knows and how much of previous lessons he has understood, but also to give the teacher a cue as to the next step in the lesson to be undertaken. They may stimulate the pupils to face new issues and to solve problems, or they may degenerate into a very formal exercise in which the teacher asks questions that can be answered by memorizing the ready-made solution of the text. At least the teacher when directing a series of questions dominates the recitation, with the constant dan-

ger that the outline of the unit of subject matter is not being followed by the pupils. This means that the pupils are content to answer questions occasionally and at the end of the hour find that they have given many ready-made solutions, possibly not thoroughly understood and probably with little appreciation of the coherence or the main objectives of the lesson. The question may be a valuable device to stimulate reasoning, but unless used by very skillful teachers, it is likely to cause the recitation to degenerate into a memoriter exercise.

The questions enumerated on page 25 illustrate the memory questions. The facts which are necessary to answer the questions are given in the descriptive paragraph. The activity which is demanded is memory of facts.

(4) Thought Questions

Suppose this question were proposed as a substitute for all the questions given: "To what extent can the industries, occupations, and locations of cities in New England be accounted for by its surface conditions?" This could be classed as a thought question and the answer to this question would demand a reconstruction of the pupil's knowledge of the surface conditions in New England. The memory of facts would not be sufficient to answer it.

The use of memory questions, detailed questions, or topical questions would not be sufficient to take care

of the four standards; they lay stress on memory of information rather than on reasoning, on information rather than conduct, and on an artificial setting. The thought question has one advantage over the questions cited above, in that it lays stress on reasoning, but in other respects, like the foregoing types, it is inadequate to meet the teaching situation demanded above.

(b) *The Topic*

The topical method of organization illustrated on pages 25, 26, and 27 may emphasize both the memory of information as such and reasoning. It may emphasize both information as an end in itself and information which modifies conduct. The artificial setting is stressed more than the natural setting. The topics are often selected dogmatically without particular reference as to whether they fit into the learner's problems. Since the principles are often stated in the topic before the need for principles arises, it is safe to assume that priority of principles is emphasized rather than the priority of problem. The topical method of teaching (the topical arrangement of subject matter), on the one hand, includes more than the method which we propose and, on the other, does not include priority of problem and the natural setting for problems. Hence the topic as used and understood in practice will not take care of the four elements which have been proposed and which are necessary to cover the type of teaching cited from agriculture and household science.

To make the topic do this, it would be necessary to enlarge the term and redefine it.

(c) *Problems, Examples, Originals, and Exercises*

The term "problem" is used very loosely in current practice. "Problem," "example," "original," and "exercise" are often used interchangeably in mathematics with little attention to exact distinctions. In geometry, according to D. E. Smith:

"The problem is distinguished from the theorem as being a proposition requiring some construction to be effected, while the theorem requires some assertion to be proved. In algebra and arithmetic certain writers have used the word 'example' to cover all problems to be solved, and some have used 'problem' to refer only to concrete exercises." [1]

The term "example" is often used in mathematics for a sample problem or solution to illustrate a certain mathematical process. In general, however, the example is an exercise which is set forth for the pupil to drill upon and to test his mathematical skill. The usual distinction between it and the problem is that the former is a symbolic or abstract statement of the facts while the latter is concrete. The distinction made by Henry Suzzallo may be cited:

"The 'example' is usually completely expressed in mathematical symbols, and the 'problem' is com-

[1] Smith, D. E., "Problem in Mathematics." Monroe's Cyclopedia of Education.

monly stated in words. . . . In the case of the example, the mathematical sign tells the child what to do, whether to add, subtract, multiply, or divide; the 'example' being a kind of pre-reasoned problem, the pupil has only to manipulate according to the sign, his whole attention throughout being focused on the formal calculation. In the second case, the child has two distinct functions: he must, from the description of the situation presented, decide through the process of reasoning what he is to do (add, subtract, divide, or multiply), and having rendered his judgment, he must proceed through the formal calculation." [1]

The term "original" is frequently used in geometry. It is similar to a new theorem; the only difference is that in the general usage, the theorem has the construction made and the proof partially or completely stated, while the original leaves the proof to the learner. In this sense it is no different from the problem as defined by D. E. Smith, on page 29.

The term "exercise" is used in a very broad and indefinite sense. A consideration of its use in the textbooks reveals the fact that it frequently covers what has been defined by problems, theorems, examples, and originals.

Before giving further consideration to the analysis of these terms, the definition of the term "problem" in its general use is given as stated by John Dewey:

"Every conscious situation involving reflection presents a distinction between certain given conditions

[1] Suzzallo, Henry, "Example." Monroe's Cyclopedia of Education.

and something to be done with them; the possibility of a change. This contrast and connection of the given and the possible confers a certain problematic, uncertain aspect upon those situations that evoke thought. There is an element, which may be slight or which may be intense, of perplexity, difficulty, or confusion. The need of clearing up confusion, of straightening out an ambiguity, of overcoming an obstacle, of covering the gap between things as they are and as they may be when transformed, is, in germ, a problem."[1]

In relation to the eight standards, while the problem may lay stress on either the memory of information or reasoning, it usually emphasizes the intellectual phase of the solution rather than its modification of conduct. It takes into account the natural setting but may and often does accept an artificial setting, and as interpreted by the leading advocates of the problem method it favors the priority of problem over the statement of principles. It does not, therefore, exclusively include all the standards which are necessary to take care of the type of situations as illustrated from agriculture and household science although it approximates this more closely than do the terms hitherto considered. The shortcoming of the problem is that the solution is not necessarily carried into action, but rather emphasizes intellectual activity. Unless the meaning of problem as the term is ordinarily used is modified, it will not take care of the items which our proposed concept embraces.

[1] Dewey, John, "Problem." Monroe's Cyclopedia of Education.

The original and example have the shortcomings of the problem and in addition they lay emphasis on the priority of principles. The exercise, an inclusive term for the three concepts, therefore, does not include the necessary standards.

(d) *Drills, Tests, and Reviews*

The types of teaching known as drills, tests, and reviews will be considered next. Drill is defined by Henderson as "the systematic endeavor to fix firmly habits or associations between stimuli and responses. These associations may connect sense stimuli with ideas or with movements, or ideas with other ideas or with movements."[1] Drills may mean the fixing of a physical or a mental habit; for example, to pass in the school line properly is a physical habit, to be able to give the product of 8×8 quickly is a mental habit. Drill is important, since much of the work, especially in the elementary school, involves the formation of automatic responses. One writer states that three fifths of the time in the elementary school is absorbed in drill.

Tests are used to measure the efficiency of the work done in schools. E. E. White wrote that "the test has for its end the disclosing of the results of instruction, drill, and study, the disclosing of the pupil's attainments."[2]

[1] Henderson, E. N., "Drill." Monroe's Cyclopedia of Education.
[2] White, E. E., "Art of Teaching," p. 53. American Book Co., 1901.

A definite statement of the meaning of a "review" is quoted from Suzzallo:

"A classroom exercise devised to survey the facts and principles previously learned by observation, discussion, reading, etc., is a review. It is literally a reviewing of already acquired knowledge in a detailed and completely connected way, so as to relate the items and emphasize the more important of them." [1]

These types of teaching involve memory of information; the test and, in some measure, the review, may involve reasoning. They may also modify conduct but in a limited way, because the act is not carried to completion. But these concepts will not lay emphasis on natural setting for solution or on priority of problem over the statement of principles. Since none of the terms includes the necessary elements for the situations previously stated, without changing the meaning of these terms as now understood, it will be seen that they cannot be used for the proposed concept.

(e) *Applications, Illustrations, Demonstrations, Experiments, and Practicums*

There is another group of methods which may be properly discussed together, for the variation in their meanings is not very great,—applications, illustrations, demonstrations, experiments, and practicums.

Application is the fifth step of the Herbartian lesson

[1] Suzzallo, Henry, "Review." Monroe's Cyclopedia of Education.

plan. In the acquisition of knowledge from the printed page the question of a complete mastery may be raised. The application of this knowledge to actual situations will guarantee a more complete mastery. In general, application has been considered as the step which applies principles previously learned. Suzzallo gives a good description of the term "application":

"In modern pedagogical practice, the principle has two modes of expressing itself: (1) In requiring that the original acquisition of knowledge and values be the product of action, as in any process of 'learning by doing.' This is the characteristic mode that the principle takes in the 'active learning' of the kindergarten and the more modern type of primary school. It is also noted especially in the teaching of manual training, laboratory science, drawing, singing, and similar subjects affording a large opportunity for action. (2) In requiring that knowledge largely communicated through conversation or the printed page be given actual application as a final safeguard against defective mastery. The principle takes this second characteristic mode in the teaching of the more abstract subjects (physics, ethics, etc.) to mature students. In this way general laws, truths, and precepts are brought into effect, tested, and, if necessary, reconstructed."[1]

The term "illustration" means an example or comparison by which a subject, a statement, or a principle is elucidated or explained.

[1] Suzzallo, Henry, "Application." Monroe's Cyclopedia of Education.

Demonstration "in its literal and etymological sense means showing something to be thus and so, pointing to an object that exists or an event that occurs so as to induce perception of it. . . . In its stricter sense, demonstration means conclusions that follow with rigid necessity from premises which are themselves regarded as necessary truths, or which are derived from such self-evident truths."[1] Demonstration is a method by which the teacher or instructor conducts the experiment before the class. It is used to teach a lesson which, for any reason, it is not practicable to carry out as a class exercise. The teaching in the natural sciences is sometimes done by demonstration, but more often the teaching is carried on by having the students conduct individual experiments.

Teaching by experiments is "part of the general movement for learning through direct observation." The instruction by experiment is sometimes called the method of "rediscovery." Suzzallo considers such a use of the term loose, "inasmuch as there is little or no inventiveness on the part of the student in the devising of apparatus or the arranging of conditions. These are all prearranged by the instructor so as to make a conclusion fairly obvious. Teaching through experimentation is a highly rational representation of scientific facts rather than a rediscovery."[2]

[1] Dewey, John, "Demonstration." Monroe's Cyclopedia of Education.

[2] Suzzallo, Henry, "Experiment, Teaching by." Monroe's Cyclopedia of Education.

The experiment gives opportunity for action, for providing the pupil with concrete experiences as well as verbal information. As a concept to take care of situations such as we have proposed, it fails in proportion as the principles are first stated dogmatically, with experiments used to explain or illustrate principles. This is too often understood to be the meaning of experiments in teaching.

The term "practicum" represents one of the latest concepts in methods of teaching. The term is used particularly in agricultural education. After a very careful search the writer has been unable to find a formal definition of the term which includes the ideas usually set forth in the descriptions given of practicums. It usually means the application of principles already learned to the carrying out of an exercise which has economic value and which is of interest to the pupil. A characterization of the term "practicum" by Heald is cited:

> "The word 'practicum' is a rather broad term, covering the briefer exercises, demonstrations, verifications, and problems, many of which were formerly called experiments. The practicum in agriculture may be for the purpose of verification or, more frequently, to acquire skill in a process which may be needed in the project work."[1]

[1] Heald, F. E., "The Home Project as a Phase of Vocational Agricultural Education." Bulletin No. 21, Agricultural Series 3, Federal Board for Vocational Education, p. 8, 1918.

The definition given in the "Standard Dictionary" is: "In some colleges and universities an academic exercise consisting of practical work, as in the laboratory." This definition, however, makes no mention of the economic aspect of the work, which seems to be a factor emphasized quite generally.

The terms "application," "demonstration," "experiment," and "practicum," then, do not make provision for the four elements which our proposed concept includes and which seem worth while to include. In each of the methods, principles are given priority over problems. In application the principles are applied; in illustration the principles are illustrated; in demonstration the principles are shown to be true or false; in experiment the principles are illustrated; in the practicum principles are applied in developing something economically valuable. In no case is the interest of the pupil aroused by being placed in a situation where principles must be developed as needed. This, after all, seems to be an exercise sufficiently worth while educationally to be embodied in a new term.

II. Summary

For the sake of clearness a summarizing statement of the shortcomings of the commonly-used terms is herewith offered.

The types of teaching involved in the use of memory questions, thought questions, detailed and topical questions do not include the four standards set up in the

proposed concept, for they lay stress on memory of information rather than reasoning, on information rather than conduct, and on an artificial setting rather than the natural setting for the problem. The thought question does lay stress on reasoning but in other respects it has for the purpose of describing the project the shortcomings of the other questions.

The topic is inadequate because it may emphasize both the memory of information as such and reasoning; it emphasizes information as an end in itself more than information which modifies conduct; it stresses the artificial setting and the priority of principles over problems.

The problem lacks in the emphasis it places on the intellectual aspect of the solution rather than the modification of conduct. The terms "original" and "example" have the shortcomings of the problem and in addition lay emphasis on the priority of principles. The exercise, an inclusive term for problem, original, and example, does not include the necessary standards.

Drills, tests, and reviews involve memory of information, although tests and reviews may involve reasoning. These terms are lacking in that they do not lay emphasis on natural setting for solutions or on priority of problem over the statement of principles.

The terms "application," "demonstration," "illustration," "experiment," and "practicum," do not make provision for the four elements which our proposed concept includes. In this group of concepts principles are

given priority over problems. In application the principles are applied; in the demonstration the principles are shown to be true or false; in experiment and illustration the principles are illustrated; and in the practicum principles are applied in developing something of commercial value.

It is evident that the foregoing commonly-used terms do not, in their ordinary meaning, denote exclusively a method of teaching, involving reasoning, primarily for the sake of modifying conduct in its natural setting, and the introduction of principles as they are needed. If any of the foregoing concepts or terms are used, some qualifying adjective would have to be added to it with attendant complication arising from confusion of meaning.

In the next chapter, the term "project," with definition and discussion, will be proposed to include these elements.

CHAPTER III

DEFINITION OF THE PROJECT

I. The Need for the Term "Project"

The discussion and analysis of the types of teaching considered in Chapters I and II show that terms now in use are, without modification of meaning, inadequate to take care of teaching situations similar to those illustrated in current approved methods of teaching agriculture and household science; and since the terms, as a rule, already have implications that are well described and understood in common practice it is preferable to adopt a new term to describe the teaching situation characterized by the four standards. This term which we propose to accept and define is the "project."

Historically the word "project" has been used for many years in business and in some specialized forms of education [1] with a rather vague meaning. Recently it has been accepted by the United States Department of Agriculture as an outlined plan for carrying on a piece of coöperative work. It was first employed in agricultural education by R. W. Stimson, who used the expression "home project" in the agricultural

[1] Particularly in the training of architects.

courses of the Massachusetts vocational schools. In 1908–1910 the unmodified word "project" was used by Stimson, Snedden, Prosser, and Allen in their report to the Massachusetts Legislature. Since its use in Massachusetts, the term with many variations in meaning has been applied to many of the subjects of the course of study.

II. A Historical Statement of the Project

A brief historical sketch by Heald of the term "project" in agriculture may be accepted as authoritative.

"For many years the term 'project' has been used to designate carefully planned investigations in agricultural science covering a considerable period of time, frequently demanding several years for their completion. Such plans, including aims and methods, have been submitted by the agricultural experiment stations of the several states and approved by the Office of Experiment Stations in the States Relations Service of the United States Department of Agriculture.

"More recently the same term 'project' under practically the same conditions has been applied to the projects in demonstration work and extension teaching carried out under the Smith-Lever Act. The term carries with it the idea of a program of importance, of some duration, and an expectation of certain tangible and valuable results.

"This term 'project' was borrowed first by secondary school teachers of science and manual arts because its use by experiment stations suggested an idea of

value in connection with the practical phases of teaching these subjects.

"In connection with the teaching of agriculture in secondary schools the idea of projects at home crystallized and took on the name of 'home project' about 1908 in Massachusetts, receiving the sanction of the State Board of Education under suitable legislation in 1911. This plan, with modifications which do not change the principal points of the definition, had been adopted in most of the states which had constructive legislation on agriculture in the secondary schools previous to the enactment of the Smith-Hughes Act. In its work on secondary and elementary school agriculture, the United States Department of Agriculture had previously accepted the prevailing conception of the home project, issuing several publications on this basis."[1]

But while the term has been of such recent origin as a school concept, the idea behind the term has been used with some modification of one sort or another by law, medicine, engineering, journalism, and the foreign languages for some time; and in various informal ways has been slowly developing in many of the subjects of the curriculum of the elementary school, the high school, the normal school, and the college.

[1] Heald, F. E., "The Home Project as a Phase of Vocational Agricultural Education." Bulletin No. 21, Agricultural Series 3, p. 7, Federal Board for Vocational Education. Washington, September, 1918.

III. The Justification and Definition of the Term "Project"

The justification for taking a term that has been in use for some time is that in general the aim of those who use it has been to take care of situations such as we have cited from agriculture and household science. The frequent use of the term seems to point to the movement seeking for a word that will cover the above-mentioned situations. Again, since few formal definitions have been proposed and since the limits of the project, as gathered from the literature, have not been clearly drawn, it will be advantageous to use it to describe such types of teaching and thus avoid the necessity of proposing another one.

The definition of the project which is proposed for substantiation is the following:

A project is a problematic act carried to completion in its natural setting.

In this definition it is to be noted that: (*a*) there is implied an act carried to completion as over against the passive absorption of information; (*b*) there is insistence upon the problematic situation demanding reasoning rather than merely the memorizing of information; (*c*) by emphasizing the problematic aspect the priority of the problem over the statement of principles is clearly implied; and (*d*) the natural setting of problems as contrasted with an artificial setting is

explicitly stated. A brief discussion of these particular phases of the definition will be given.

(*a*) The presentation of subject matter or the staging of a situation which results in activity, in carrying out the act to completion as over against the passive acceptance of information, is one of the most significant contributions of the project. For the term "act," or "action," the definition of E. B. Titchener may be accepted:

> "In its most general meaning, an action is an organized movement; less generally, it is a movement of a locomotor organism; . . . The characteristic feature of the action consciousness, as distinguished from the consciousness so far considered, is its predetermination in the sense of the idea of end. The presentation of the object arouses associative tendencies in the usual way; but only those tendencies are realized which lie in the line of suggestion, of the meaning of the idea of end.
>
> "We translate this fact into physiology by saying that the excitatory processes underlying the idea of end set up determining tendencies; they open certain nervous channels as it were, and close others; so that the consequent excitations find their path laid out for them."[1]

In ordinary usage of the term, activity means the contraction and relaxation of muscles in physical activity. For educational purposes, the meaning

[1] Titchener, E. B., "A Textbook in Psychology," pp. 448–449. The Macmillan Company, 1910.

should be broadened to include the situations defined by Dewey, "as a series of changes definitely adapted to accomplishing an end."

"Hence it is opposed to restless and random changes, as well as to mere quiescence and passive absorption. Dictated exercises, 'busy work,' etc., when not accompanied by any sense of a result to which they naturally contribute, are not activity in its genuine, or intellectual significance; neither is undirected overflow of motor impulse."[1]

There are many different kinds of activity, intellectual, social, religious, and physical. The project does not limit itself to physical activities alone but makes provision for acts of other types, provided that the individual takes a part in the purpose, choice, and reflection of the directed action. Thus "physical activity when not accompanied by any sense of the result" is not considered activity, but intellectual activity when accompanied by a "sense of result" is considered an activity in an educational sense.

In a recent article describing the problem-project method, W. B. Owen considers the psychology of the act an essential feature.

"The third fundamental moment in the problem method is the psychology of action. This psychology is based on the anatomy of the nervous system. This nervous system consists of a series of five elements,

[1] Dewey, John, "Activity, Logical Theory and Educational Implications of." Monroe's Cyclopedia of Education.

sense organ, sensory nerve, brain, motor nerve, muscle. A complete act involves all five. Reflex and instinctive acts do not require thinking. Habitual acts may dispense with thinking. New situations, however, cannot be met by reflex, instinctive, or habitual reactions. The new problem requires thought for its solution. The brain suspends the activity of the series of the five elements until the right action is thought out. Once thought out, the series is restored and the act follows. If the right result follows, the problem is solved. But it takes a complete act to get a complete experience. Only the complete experience can test the value of the thought. That is why we learn by doing. The problem, therefore, calls for a new form of action, and thinking is the means of establishing this new form of action." [1]

The importance of action is well summarized by W. B. Pillsbury:

"Every once in a while one observes an individual who knows the right and approves, but does wrong. The only cure for this condition is to develop a habit of action. This can be done most effectually by making the child appreciate the advantages of action and the disadvantages of inaction. An individual left to take the natural consequences of his acts will soon develop a habit of doing the thing that he sees should be done, at the same time that it should be done. It is only the individuals who are protected from the consequences of inaction and indecision who continue inactive in the face of acknowledged duties. If a habit

[1] Owen, W. B., "The Problem Method." Chicago Schools Journal, Vol. 1, p. 5, 1918.

becomes established, there is no longer question whether a thing shall be done or not; the situation at once evokes a decision and the decision evokes the act." [1]

The educator, in giving emphasis to the different standards of teaching, should be certain that emphasis is not given to passivity and that pupils are not "protected from the consequences of inaction" by the methods used in school. The project includes the act and gives a maximum of emphasis to training in action.

The expression "problematic act" has been formulated and used in the definition of project for the distinct purpose of emphasizing not only the act but also the problematic aspect of the act.

(*b*) It is essential that the project be understood to include a problem; otherwise it could not be differentiated from habits and reflexes, as W. W. Charters well illustrates:

"First, the project is a problem. This differentiates it from reflex and habitual acts such as digestion and respiration which are normally carried on without the intervention of consciousness, or from knitting or dishwashing, when they have become habitual. Any of these may become problems, as the control of respiration to the singer, or knitting to a novice. They are problems when they require thought but when they are reflexive or habitual they are no longer problems." [2]

[1] Pillsbury, W. B., "Essentials of Psychology," p. 312. The Macmillan Company, 1911.

[2] Charters, W. W., "The Project in Home Economics Teaching." *The Journal of Home Economics*, Vol. 10, p. 114, March, 1918.

Habits and reflexes such as the foregoing, since a problem is not involved, nor a difficulty demanding solution present, cannot be considered as acts in the sense which the project demands.

The project may of course include habits and reflexes provided, in addition, that there is involved a problem or a situation, demanding reasoning for a solution, as the following illustration of controlling the San José scale will indicate. The lime-sulphur mixture may be decided upon as the most advisable remedy and the consequent purchase of lime and sulphur may take place habitually with a minimum of thought. The preparation of the solution and the actual spraying of the trees may be taken care of largely by habit. The problematic phase is included when the results of the treatment are watched carefully and a tentative judgment rendered as to its effectiveness, with a probable decision to vary the mixture or substitute a better remedy to meet the conditions.

(*c*) The problem aspect of the project not only involves reasoning but contains a distinct implication of priority of the problem situation over the statement of principles. There are two methods of arriving at solutions or results as carried on in life; the one is a knowledge of principles already learned as when the one making the solution knows the principles and then tries to apply them; and the other, which we call the problem method, when the first approach is made by the learner to a difficulty. In the latter method prin-

ciples are developed as needed, while in the former most of the principles have been learned and the problem is one of application. The problem method carries with it the implication that principles will be developed as needed and not learned first. Hence the project, which makes specific provision for the problem, lays emphasis on its priority over the statement of principles.

The method of arriving at a solution, where the principles have been learned first and the problem is largely one of applying them, can with greater accuracy be called the original, laboratory exercise, application, or practicum. For instance, in connection with the study of vegetables, it may be proposed that each student prepare a garden and grow the vegetables. If this were done merely to illustrate or give a practical laboratory exercise upon the principles learned in school it could be considered as an application or laboratory exercise. The practicum would differ only in the insistence that there should be some commercial value. The project would indicate and set the stage of the task, but most of the principles would be developed by the pupils as they needed them in the prosecution of their work.

(*d*) The implication of the meaning of the term "natural setting" has been discussed in Chapter I, and it is unnecessary here to go into detail other than to state that the project provides for the natural setting of situations, which means that the solutions under-

taken in school are no different because they are school problems than they would be were they to come up in life outside the school.

A statement of W. W. Charters shows the difficulty in describing or defining natural setting:

"The term natural setting is full of difficulties of definition when carried into the interior of any body of subject matter, but for our purposes [in home economics] it is relatively simple as an illustration will make clear. The problem of canning may be carried into the field of practice by the canning of a small amount of fruit in small utensils, and the student may learn the practice of canning or perhaps it is better to say obtain a simple illustration of the practice. But this is not the natural setting of the action. The amount of fruit is unusual. If the student were canning at home she would have to can a peck or a bushel and would have to use several jars. The process is also unnaturally simple. If she were canning a bushel of fruit she would probably have simultaneously to watch a fire, get many jars ready, find proper places to set them, or attend to one portion while another is cooking." [1]

A few additional illustrations of problems in natural setting may help clarify its significance.

The determination of the profitable cows in the father's dairy herd may be undertaken by the boy, utilizing the scientific method taught in the school. He will be brought face to face with many difficulties in

[1] Charters, W. W., "The Project in Home Economics Teaching." *The Journal of Home Economics*, Vol. 10, p. 116, March, 1918.

keeping a daily record, in perfecting his methods, and in evolving his principles as he needs them in making the determination. While this may be a part of the school program, yet the setting is essentially identical with that of the dairyman who makes this test.

The writer, in teaching the subject of machines to a mixed class, brought to the school yard for purposes of illustration a windlass, block pulleys, and a large board which could be used as an inclined plane. The members of the class were given problems in the manipulation of the pulleys and windlass to show the advantages of the machines. The whole lesson was interesting and probably more spectacular than a demonstration given in the laboratory with model pulleys and windlass. But while this lesson may have been effective, it could not be classed as a project, since the setting was artificial. One of the members of the class, however, had already been busy with the task of lifting baled hay into the barn loft with the aid of a single fixed pulley, which gave him the advantage of direction but nothing else. For him this exercise developed into a project, for he took up the problem which faced him, finding his principles and making the application, with the result that he installed a pulley in the loft with the ratio of 1 : 6. Later, he reported to the class the entire development of this project, laying particular emphasis on the ease of the task as compared with the difficulty of the former procedure. For the boy this was a project, since the

problem was carried into completion in its natural setting.

There may be some question as to whether a proposed project begun in its natural setting, although not completed or even barely started in its natural setting, can be considered as meeting the requirement of carrying the act to completion in its natural setting. This question seems significant to propose, although the literature does not indicate its importance. The task begun but not completed in its natural situation is well shown in the following: A boy may have the problem of finding good seed corn for his father. He may become very much interested at the time in the method of testing seed corn because of the proposed purchase. If the boy takes some of the seed corn to the laboratory, tests it as a mere laboratory exercise, and stops there, he has the exercise arising in its natural setting but not carried to completion in its natural setting. This may be called an uncompleted project. If the boy had tested the seed sufficiently to be able to give his father scientific advice, the process would have constituted a project. Again, the growing of a few rows of potatoes may be the project accepted and the method of planting potatoes, the purchase of the seed, and the actual planting may go on, but if the task is given up for any reason, as when the potato bugs attack the plants, then the project is not completed and may be called an incomplete project. The following year the boy may accept as his problem the

method of destroying the potato-bug pest, and may find out how to do it, yet this will be termed a problem because it was not handled in connection with the actual situation of controlling the pest.

The act carried to completion in its natural setting indicates that the learner has used material and data in a way which is no different from what it would be were it done outside of school. He has thereby derived a greater functional value than if the act were not completed or completed in an artificial setting.

The situations which were proposed in connection with the study of household science and agriculture will be considered in the light of the definition given for the project, to see if situations of this nature can be properly cared for by the project as defined and explained.

The boy who controlled at least one pen of poultry with facilities for feeding a balanced ration and trap nesting individual birds for comparison of productivity in laying, would be brought into a situation which demands reasoning. The memory of information would not be sufficient to carry on this problem for the conditions as they change daily demand reasoning. The results of his investigation and the principles evolved as needed would result in the completion of the act in its natural setting. If the boy had become interested in the project, had started it, but had discontinued it after a few days or weeks, no results of any consequence would have been evident and it would have

illustrated a situation arising in its natural setting but not carried to completion.

The girls in household science who purchased and prepared well-balanced meals for the family for a specified time would be brought into many situations which demand reasoning. Since the conditions of these situations would change daily, reasoning rather than memory of information would be demanded. Principles and methods of procedure developed as needed would result in completing the act in its natural setting.

To provide a concept which takes care of all such situations where emphasis must be given to reasoning, to carrying the act to completion (the modification of conduct), to the priority of the problem and to the natural setting for problems, the project, as defined by the writer, is satisfactory.

IV. Criticism of Current Definitions

Situations such as the foregoing have been recognized for a long time by educators as a type of educational problem which challenges attention, even though it has seemed difficult to devise a teaching unit which would handle such a situation. The pressing need of such a concept has led to discussion of the project with concurrent definitions which vary more or less in inclusiveness, but which indicate a search for a concept such as proposed. The literature dealing with the project, its significance and use, is quite extensive. The published

definitions or characterization of the project, together with supplementary definitions received from writers at the request of the author, follow, together with criticisms and a summary. These definitions have been proposed by teachers who may be classified as follows: (1) general educational theory, (2) agriculture, (3) science, (4) industrial education, (5) English, and (6) primary. The definitions will be given first according to this group classification. A discussion and comparison of each definition with the four standards which have been proposed in Chapter I will follow.

(a) *Definitions Proposed by Teachers Interested in General Educational Theory*

Charters' View of the Project. — "The project is considered to be an act carried to completion in its natural setting and involving the solution of a relatively complex problem." [1]

This definition by Charters gives specific emphasis to the problematic phase of the project which distinguishes it from habits and reflexes. Mental processes are considered to be problems when they involve thinking. In another paper Charters, in discussing the topical method, calls attention to the weakness of this method of confining most of the mental activity largely to memory. Again, in this same paper he states that

[1] Charters, W. W., "The Project in Home Economics Teaching." *The Journal of Home Economics*, Vol. 10, p. 114, March, 1918.

"the prime essentials of the project are, that it must involve the solution of a problem and that it must culminate in action."[1] The act carried to completion is a recognition by Charters that conduct is favored over information as an end in itself. The priority of the problem over statement of principles is indicated by the author in the paper, "Systematic Topics, Multi-Problems and Projects":

"In the topical organization principles are learned first, while in the project, the problems are proposed which demand in the solution the development of principles by the learner as needed."[2]

The natural situation for problems is one of the main elements in the definition. In citing other advantages for the project, the writer indicates that "it gives training in locating and solving problems, it gives training in the technique of action, and it teaches subject matter in connection with life situations."

The definition proposed by Charters designates the act as complex. This statement seems to limit its scope. There may be certain activities which can very well be classed under the term "project" and yet be relatively simple. For example, the girl who decides to make a special loaf of bread and who develops new principles as needed in carrying this simple act to com-

[1] Charters, W. W., "Systematic Topics, Multi-Problems and Projects." Paper read before Illinois State Teachers' Association, Dec. 28, 1917.

[2] *Ibid.*

pletion, is carrying out a solution which is a project. If such situations are not included under the term "project" another term would be demanded, which would surely lead to confusion, particularly in the distinction of simple acts and complex acts.

The definition suggested by Charters, then, includes the four standards of teaching but seems to limit its scope in including only relatively complex problems.

Kilpatrick's Proposals. — The following definition is proposed by W. H. Kilpatrick:

"The term 'project' contemplates a complete act (or experience) which the agent projects, purposes, and within limits sees through to completion."[1]

Since the learner projects and purposes the solution it seems evident that more emphasis is placed on reasoning than on reproductive memory. In projecting a solution conditions will vary; new situations will arise. which demand some degree of reasoning. The complete act is contemplated but apparently not enough emphasis is laid on carrying the act to completion, for the latter part of the definition indicates that there are limitations in carrying it through. Since conduct is modified to the extent that the act is carried to completion, we seem warranted in making the statement that the maximum modification of conduct is not a significant element in this definition. There seems to

[1] Kilpatrick, W. H. Definition proposed in a letter to the writer, March 21, 1918.

be a slight inconsistency in the definition, for if the project contemplates a complete act, it would seem that the realization of a complete act would be necessary rather than an approximation to one, as indicated in the phrase, "*within limits* sees through to completion." The priority of the problem over the statement of principles and the provision for the natural setting of the problem are not clearly indicated. The definition by Kilpatrick includes provision for reasoning and for the completion of the act "within limits," but makes no clear provision for the natural setting of problems or the priority of the problem over the statement of principles.

In a published article appearing after the above definition was sent to the writer, Kilpatrick defines the project as a "wholehearted purposeful activity proceeding in a social environment, or more briefly in the unit element of such activity, the hearty purposeful act."

"It is to this purposeful act with the emphasis on the word purpose that I myself apply the term 'project.'"[1]

An illustration of the term "project" or "hearty purposeful act" is cited.

"Suppose a girl makes a dress, if she planned it, if she made it herself, then I should say the instance is

[1] Kilpatrick, W. H., "The Project Method." *Teachers College Record*, Vol. 19, No. 4, September, 1918, p. 320.

that of a typical project. We have a wholehearted purposeful act carried on amid social surroundings. That the dressmaking was purposeful is clear; the purpose once formed dominated each succeeding step in the process and gave unity to the will. That the girl was wholehearted in the work was assured in the illustration. That the activity proceeded in a social environment is clear; other girls at least are to see the dress." [1]

Since the learner plans the solution with wholehearted activity it would seem that reasoning is given more emphasis than the memory of information (reproductive memory). In planning and carrying through the solution, new situations will arise, conditions will vary, which will demand reasoning. Apparently the act carried to completion is contemplated; this is indicated by the illustration of the girl making the dress. "Suppose a girl makes a dress, if she planned it, if she made it herself, then I should say the instance is that of a typical project." Note that the illustration mentions the completion of the dress. It is probable that the complete act is considered, for the definition does explicitly state "wholehearted purposeful activity proceeding in a social environment." The definition provides for the activity being carried on but not necessarily completed unless the expression in the latter part of the definition takes care of this "or more briefly,

[1] Kilpatrick, W. H., "The Project Method." *Teachers College Record,* Vol. 19, No. 4, September, 1918, p. 321.

in the unit element of such activity, the hearty purposeful act." While the illustration seems to indicate that the act is carried to completion, it would be more clarifying to have it explicitly stated in the definition. The priority of the problem over the statement of principles and provisions for the natural setting of the problem are included in the definition. The natural setting is probably taken care of by Kilpatrick in his insistence that the activity proceed in a "social environment." The use of the term "social environment" is somewhat confusing owing to the different meanings which the term "social" has taken on. Consequently it is difficult to determine whether or not "social environment" as used by Kilpatrick fulfills the requirements of "natural setting" as used by the writer. Any act is social which has any relation to anyone else. The antithesis of this is non-social. Social may mean coöperation — the sharing of purposes, ends, or aims. Anti-social is the antithesis of this meaning of social. Again, social means understanding, appreciating the motives, desires, ambitions, and impulses of others. The probable antithesis of this meaning of social is formal "righteousness" like that of the Pharisees. If social were to be interpreted broadly, as in the first meaning of social, then "social environment" would approximate the meaning of "natural setting." He considers the "purposeful act" a typical unit of the worthy life and "as the purposeful act is thus the typical unit of the worthy life in a democratic

society, so also should it be made the typical unit of school procedure. We of America have for years increasingly desired that education be considered as life itself and not as a mere preparation for later living." [1] Kilpatrick, in this definition, makes provision for reasoning; for carrying the act to completion (although not specifically stated in the definition, but provided for in the illustrations); for the natural setting of problem (activity to proceed in a "social environment"); and for the priority of the problem over the statement of principles.

Bobbitt's Suggestions. — Although Bobbitt does not specifically define the project in his study of the curriculum, yet he gives an illustration of the project method which may well be examined to see the elements which he includes in the term "project."

"On the work-level, the task to be performed is central; and the science is organized about it. A boy, for example, in the school shop wishes to construct and operate a telegraphic apparatus. This ambition will serve as the center of the science training. He will be motivated to gather information concerning batteries, wiring, electro-magnets, making and breaking of circuits, etc. He will learn just the things that he needs for the task in hand; and nothing more at the time. Through using his ideas in the planning and in the actual construction he comes to realize the full significance of the various facts. The derived interest

[1] Kilpatrick, W. H., "The Project Method." *Teachers College Record,* Vol. 19, No. 4, September, 1918, p. 323.

aroused is for most individuals more potent than the native interest in the abstract science facts and principles. For this reason the knowledge is more effectively driven home and remembered.

"There is a strong drift in public education toward this project-method of organization. The school corn clubs, for example, assemble all possible information relative to the growth of corn and use it for the control of practical procedure. . . . The tree-protecting league gathers all possible facts concerning the species of trees attacked by insects, fungi, etc., together with the scientific information needed for combating the destructive influences. They reject for the time all botanical or entomological information that has no bearing on the problem in hand. . . . In brief, one learns the things needed for directing action in connection with the situations in which the action is to take place, and just previous to the drawing up of the plans. Only under such circumstances can knowledge properly reveal its significance, be rightly focused upon human affairs, or be normally assimilated. Knowing and doing should grow up together." [1]

Since the learner plans the solution and in its development gathers information, it is clear that reasoning is given a more prominent place than memory of information. In planning and carrying out the solution reasoning will be used and the true significance of the facts will be realized. "Through using his ideas in the planning and in the actual construction he comes

[1] Bobbitt, Franklin, "The Curriculum," p. 30. Houghton Mifflin Company, 1918.

to realize the full significance of the various facts." The act carried to completion is implied by Bobbitt. In the quotation in this paragraph he mentions "the actual construction," which seems to show that the act carried to completion is made a part of the project idea. Again, the act is considered. "In brief, one learns the things needed for directing action in connection with the situations in which the action is to take place, and just previous to the drawing up of the plans." Since the act is carried to completion, conduct is modified more than if the memory of information for its own sake were emphasized.

The problem is given priority over the statement of principles. In the illustrations which Bobbitt cites, principles are learned as needed in the solution as this quotation indicates. "He will learn just the things he needs for the task in hand" and again he suggests that the "primary thing in the student's consciousness is the project, the piece of work to be done; not the satisfaction of intellectual interests." The natural setting for the problem seems to be included in Bobbitt's description and illustration of the project, although this is not specifically emphasized.

The elements included by the writer in the project idea are taken care of in Bobbitt's illustrations. The modification of conduct and the priority of the problem are illustrated, while the natural setting for the problem and the act carried to completion, although not specifically mentioned, seem to be elements.

Stone's Definition. — In order to understand clearly the definition proposed by C. W. Stone: "A project is a Life Topic in which the processes and objects of learning are largely manual,"[1] additional quotations will be given, showing the author's meaning of the terms used. "Life Topics" may be variously defined as,

"Units of learners' experience in which both learners and teachers recognize worthy value.

"Units of learners' experience that are worthy of re-making in terms of more formal subject matter.

"Units of learners' experience out of which the more formal subject matter may be differentiated.

"Phases of life that are worthy of improvement.

"A consideration of these definitions leads one immediately to an analysis of life value, and a helpful analysis is in terms of thinking, doing, and feeling: for it is in these three lines that we do our living and have our experience. A Life Topic, then, in which thinking predominates, evidently holds values that are to an extent different and distinguishable from the value of a Life Topic in which doing predominates; and a Life Topic in which feeling is the important value is also distinguishable from either of the above. The terms which seem best to fit these three types of Life Topics are "problem," "project," and "appreciation unit." The definitions of these terms may be worded, then:

"A 'problem' is a Life Topic (unit of learners' experience) in which the processes and objects of learning are largely mental.

[1] Stone, C. W., "Teaching Units." Summary sent to writer, March 21, 1918.

"A 'project' is a Life Topic in which the processes and objects of learning are largely manual.

"An 'appreciation unit' is a Life Topic in which the processes and objects of learning are largely emotional.

"It should not, of course, be understood that there will be no manual elements in a problem or that there will be no thinking in a project; much less would it be safe to come to the conclusion that there will be no appreciation in problems and projects." [1]

The definition outlined by Stone makes provision for reasoning, but the wording states negatively that there may be reasoning but not positively that it must be included: "It should not, of course, be understood . . . that there will be no thinking in a project." Life Topics defined as "phases of life that are worthy of improvement and in which the learner recognizes a worthy value," indicate that the modification of conduct has been considered. Another example shows that the completed act is an element in the definition:

"In a community in which cotton will mature it is best studied as a project, and the work will include the raising of the plant, picking of the fibre, simple ginning, etc." [2]

The natural setting finds its implication in the writer's use of the Life Topic, which gives to the project the setting that an activity would have if taken up

[1] Stone, C. W., "Teaching Units." Summary sent to writer, March 21, 1918.

[2] *Ibid.*

out of school. The priority of the problem over the statement of principles is indicated in the definition of Life Topics as "units of the learners' experience that are worthy of re-making in terms of more formal subject matter." It is quite likely that the statement of principles first would indicate what Stone means by formal subject matter.

Snedden's Use of the Term. — Among the men in Massachusetts who used the term "project" in connection with agricultural teaching particularly as applied to the home project, none was more prominent in this leadership than David Snedden. The discussions and uses of the project made by Snedden are discussed under this first classification rather than under the definitions proposed by men interested in agricultural education because of Snedden's interest in and contributions to general educational theory. His description of the term "project" is cited:

"A few years ago some of us began using the word project to describe a unit of educative work in which the most prominent feature was some form of positive and concrete achievement. The baking of a loaf of bread, the making of a shirtwaist, the raising of a bushel of corn, the making of a table, the installation of an electric-bell outfit — all these, when undertaken by learners, and when so handled as to result in a large acquisition of knowledge and experience, were called projects. Projects of this kind might be individual or joint (coöperative). They might be executed in an ordinary lesson period or they might claim the efforts

of the learner for one or more hours per day for several weeks.

"The following were the primary characteristics of projects as thus conceived: (*a*) the undertaking always possessed a certain unity; (*b*) the learner himself clearly conceived the practical end or outcome to be attained, and it was always expected that this outcome was full of interest to him, leading him on, as to a definite goal to be won; (*c*) the standards of achievement were clearly objective — so much so that the learner and his fellows could, in large part, render valuable decisions as to the worth — in an amateur or in a commercial sense — of the product; and (*d*) the undertaking was of such a nature that the learner, in achieving his desired ends, would necessarily have to apply much of his previous knowledge and experience — perhaps heretofore not consciously held as usable in this way (*e.g.* art, science, mathematics, special tool-skill) — and probably would have to acquire also some new knowledges and skills. In a sense any concrete job undertaken in a vocational school where the realization of valuable results in the product constitutes an important end, might be called a 'project' but to be an 'educational project' such a job (*e.g.* . . . wiring a room, growing a half-acre of potatoes, etc.) must be of such a nature as to offer large opportunity, not only for the acquisition of new skill and experience in practical manipulation, but also for applications of old, and learning of new, 'related knowledge,' art, science, mathematics, administration, hygiene, social science, etc." [1]

[1] Snedden, David, "Project as a Teaching Unit," *School and Society*, Vol. IV, pp. 420–421, 1916.

The particular element which Snedden seems to emphasize in the project is "some form of positive and concrete achievement." Much attention is given to the application of knowledge previously learned. Although there is a suggestion that new knowledge and principles will be developed as needed, the definition indicates that probably new knowledges and skills would be acquired. Both the application of old knowledge and the acquisition of new are recognized in the statement in which he suggests that an "educational project" must be of such a nature as to offer opportunities not only for the acquisition of new knowledge but also for the application of the old.

The fact that Snedden emphasizes positive achievement so strongly implies that the act must be completed, the work carried to a conclusion; thus modifying conduct maximally as contrasted with the memory of information for its own sake. Reasoning is emphasized because the individual must carry out the project under varying conditions, applying old knowledge, developing new, as the situations demanded. While the natural setting for problems is not mentioned as a part of Snedden's definition, yet the illustrations cited (growing a half-acre of potatoes, taking commercial charge of three cows for a year, wiring a room) would seem to justify the statement that he does make the natural setting an element in the project. The priority of the problem over the statement of principles is not considered to be essential by Snedden, in fact the

project in his opinion applies principles already learned and in carrying the work to completion develops new ones. The definition and use of the project as outlined by Snedden is limited in scope, for seemingly only acts which demand manual activities are considered projects. This would make it difficult to provide projects in civics, sociology, and English.

(b) *Definitions Proposed by Men Interested in Agricultural Education*

Stimson, Allen, and Prosser. — Several definitions or characterizations have resulted from the extensive use of projects in the field of agriculture. The definition by Stimson, Allen, and Prosser is as follows:

"Finally, a farming project, as the term is here used, is a thing to be done on a farm, which, in the preparation for doing it and the carrying of it out to a successful result, would involve a thoroughgoing educational process. A complete definition of a 'project' as here used has three elements. . . . (1) something to be done on a farm, (2) under specified conditions and for a specified valuable result, and (3) requiring a thoroughgoing training. The farming project may include (1) improvement projects; (2) experimental projects; and (3) productive projects." [1]

[1] Report of the Board of Education of Massachusetts on Agricultural Education, 1911, pp. 41–43. Also reported in Stimson, R. W., "The Massachusetts Home Project Plan of Vocational Agricultural Education," U. S. Bureau of Education, Bulletin 579, p. 13, 1914.

This definition makes a specific place for the natural setting of problems; they are connected with the farm and its activities. The project modifies conduct in laying emphasis on carrying the act to completion "for a specified valuable result"; and reasoning is implied in the statement that it must involve "a thoroughgoing educational process." The meaning of this expression is uncertain, but since the conditions of the projects outlined vary, and the pupil must make his own decisions under these varying conditions, reasoning as over against memory is certainly implied as a necessary element.

The definition does not indicate the priority of the problem over the statement of principles but Stimson seems to indicate this in the following quotation:

> "The training of the boy who desires a vocational agricultural diploma includes, as we have seen, the subject study of English, history, civics, botany, chemistry, and general agricultural subjects, such as soils, tillage, and crop rotation. That this subject study does not precede but accompanies or follows the boy's project study directly and decidedly enhances its value." [1]

This, of course, does not state that the priority of the problem over the statement of principles is always desirable. In another statement, however, Stimson

[1] Stimson, R. W., "The Massachusetts Home Project Plan of Vocational Agricultural Education," U. S. Bureau of Education, Bulletin 579, p. 37, 1914.

implies that the project is looked upon as a means of illustrating and using principles already known as well as to develop new principles and acquire new knowledge:

"The movement from observed data of agricultural production to general laws and principles is followed by the reverse movement, which is embodied in the application of the laws and principles of science — embodied, that is to say, in economic agricultural enterprises conducted by the pupils on their home farms under competent school supervision."[1]

W. H. French. — In a report on agriculture in the high schools of Michigan, published in 1916, W. H. French gives a definition and illustrations:

"The 'home project' may be defined as a piece of farm work selected by the student with which to illustrate some theory, or to demonstrate some plan of procedure which has been presented in the course of the school instruction. For instance, a certain theory has been presented in regard to corn culture, and the boy undertakes to raise an acre or more of corn in accordance with the instruction. This would constitute a home project. Or if a certain plan of raising alfalfa had been taught, the boy would elect to demonstrate the truth of the teaching by raising a plot of alfalfa; or the necessity for keeping a record of milk or butter production of dairy cows has been taught in school, and the boy undertakes to keep a record of each

[1] Stimson, R. W., "The Massachusetts Home Project Plan of Vocational Agricultural Education," U. S. Bureau of Education, Bulletin 579, p. 38, 1914.

cow in his father's herd for the season to show whether they are profitable animals to keep on the farm." [1]

The project as conceived by French carries the act to completion in its natural setting and thus provides for the modification of conduct, but the definition does not provide for the priority of the problem over the statement of principles; on the contrary, he considers that the project is a piece of work selected to illustrate some principles already studied or learned. Reasoning is provided for only on the basis of applying principles. According to the standards that we have set up, such exercises could not be classed as projects, but could very well be brought under the term "practicum," meaning by this application of principles with the emphasis on the economic value of the product.

Barrows, Lane, and Heald. — The definition and characterization of the term "project" has been discussed at some length by H. P. Barrows, C. H. Lane, and F. E. Heald of the United States Department of Agriculture. This formulation is evidently the coöperative work of the three men:

"The term 'home project' applied to instruction in elementary and secondary agriculture includes each of the following requisites: (1) There must be a plan for work at home covering a season or a more or less

[1] French, W. H., Report of Agriculture in the High Schools of Michigan, 1916. Also quoted in Lane, C. H., "Aims and Methods of Project Work in Secondary Agriculture," *School Science and Mathematics*, Vol. 17, pp. 805–806, December, 1917.

extended period of time; (2) it must be a part of the instruction in agriculture of the school; (3) there must be a problem more or less new to the pupil; (4) the parents and pupil should agree with the teacher upon the plan; (5) some competent person must supervise the home work; (6) detailed records of time, method, cost, and income must be honestly kept; and (7) a written report based on the record must be submitted to the teacher. This report may be in the form of a composition or a booklet." [1]

"A distinction should be drawn between a project and a simple exercise used as a practicum to illustrate some principle, or for the purpose of increasing skill in some operation of farm or shop. A project, to be worthy of the name should involve skill in many operations, and the application of a number of principles. To accomplish this it should cover a branch of farming that will extend over a comparatively long period of time. The testing of seed corn may be cited as an example of a simple laboratory exercise performed at school. The stringing of seed corn would be a suitable home practicum, the aim of which would be to acquire skill in a useful operation. The growing of an acre of corn would involve both of these operations and many others, hence it would be a worthy project." [2]

[1] Lane, C. H. and Heald, F. E. U. S. Department of Agriculture, Bulletin 281, States Relations Service, p. 1, Aug. 12, 1915. Barrows, H. P. U. S. Department of Agriculture, Bulletin 346, States Relations Service, p. 4, Feb. 21, 1916. Heald, F. E., "The Project in Agricultural Education," *General Science Quarterly*, Vol. 1, p. 166, March, 1917. Lane, C. H., "Aims and Methods of Project Work in Secondary Agriculture," *School Science and Mathematics*, Vol. 17, p. 807, December, 1917.

[2] Barrows, H. P. U. S. Department of Agriculture, Bulletin 346, States Relations Service, p. 4, Feb. 21, 1916.

In explanation of the seven requisites of a home project, Heald in another article says:

(1) "The plan must have an aim which is in accord with the general scheme of work, in which the pupil has an interest at the outset and in which there is some problem more or less new. The person who approves the project at the outset should have some broader view of the applications and should shape the general plan accordingly.

(2) "The project should involve principles already studied or which are studied concurrently with the practice. The discoveries of others should be found out, either by observation or by reference study, and records of these should be compiled. Problems, practicums, demonstrations and occasional experiments may be necessary as a part of the project. These in themselves may be within the dictionary definition of the term project but we have already these other terms in the vocabulary of education. The exact line of demarcation between a short project and a longer practicum may as well be left undecided, but the tendency to give to everything which may be 'projected' or planned the name project is unnecessarily confusing.

(3) "The records and reports covering each of the steps or processes with final conclusions or results should be preserved. All of these points will apply, whether the project is for an individual or a group; at school, at home, or elsewhere in the community. To start with a definite aim, to do certain correlated lines of work covering a fairly extensive field or period of time, and to bring together everything bearing on the main aim are essential points in a project." [1]

[1] Heald, F. E., "The 'Project' in Agricultural Education," *General Science Quarterly*, Vol. 1, pp. 167–168, March, 1917.

This characterization of the project, with the additional explanations, shows that reasoning is favored over the mere memory of information, for the writers consider it essential that some "problem more or less new" be present, that the natural setting be provided for in making the projects apply to the farm, and that conduct be modified, for the completed act is assumed. The writers, however, do not make the priority of the problem over the statement of principles an essential factor ("The project should involve principles already studied or which are studied concurrently with the practice"), but all agree that there should be a new problem involved in the project.

In a later paper, Heald does not place emphasis on the project being used to illustrate or involve principles already studied. One essential of the project is "a carefully drawn plan covering a considerable extent of time, with a definite aim, including some problems new to the pupil and outlining with sufficient detail the methods to be employed." [1] Again, this statement seems to show that much emphasis is placed on the development of principles as needed. "As a fact, many of the lessons which the boy learns best are the outcome of emergencies which he faces in his project and must look up at once to save his crop." [2]

[1] Heald, F. E., "The Home Project as a Phase of Vocational Agricultural Education," p. 9.

[2] *Ibid.*, p. 17.

(c) *Definitions Proposed by Teachers of Science*

The project has been developed and used somewhat extensively by teachers of science, yet very few definitions have appeared and even these probably could better be termed characterizations. The most comprehensive formulation has been given by C. R. Mann:

"(1) A desire to understand the meaning and use of some fact, phenomenon, or experience. This leads to questions and problems. (2) A conviction that it is worth while and possible to secure an understanding of the thing in question. This causes one to work with an impelling interest. (3) The gathering from experience, books, and experiments of the needed information, and the application of this information to answer the question in hand." [1]

A few citations from the writings of John F. Woodhull will give his views of the project method in science:

"The purpose of science teaching in all grades of schools is not chiefly to impart knowledge of subject matter but to train persons in the method of the masters, which is invariably the project method. This is the method used by intelligent men in achieving their ends, in school or out." [2]

"The real way to learn fundamental principles is to attack those problems of which life is full for each

[1] Quoted by Woodhull, John F., "The Aims and Methods of Science Teaching," *General Science Quarterly*, Vol. 2, pp. 249–250, November, 1917.

[2] Woodhull, John F., "The Aims and Methods of Science Teaching," *General Science Quarterly*, Vol. 2, p. 249, November, 1917.

individual, not through the preparatory fallacy called the scientific method, but by a 'forked road situation.' The school should prepare pupils to walk alone by attacking real problems as Archimedes, Galileo, Davy, Faraday, Pasteur, Tyndall, and all the rest did. Most of us know, if we would think back over our experiences, that we never really learn these so-called fundamental principles until they come to us as an interpretation of some of our life's problems." [1]

"The great masters of science, Galileo, Faraday, Pasteur, Darwin, etc., illustrated in all their lives and work the project method. The intelligent man illustrates it in all his work outside the field of education. High-school pupils use the project method in all of their self-directed work outside of school. But when the schoolmaster undertakes to direct the pursuit for knowledge, he formalizes, he systematizes, he schematizes, and invariably inverts the natural order of learning. The result is that our young people are getting their real science through various outside agencies." [2]

Woodhull indicates that the project method is nothing more nor less than the method of the scientist adapted to children. In order to get a better notion of Woodhull's conception of the project it is necessary to determine just what is the method of the scientist. Morris Meister of Columbia University gives the following analysis of the scientist at work which illustrates

[1] Woodhull, J. F., "Science Teaching by Projects," *School Science and Mathematics*, Vol. 15, p. 229, 1915.

[2] Woodhull, J. F., "The Teaching of Science," p. 233. The Macmillan Company, 1918.

or describes more specifically the concept which Woodhull terms "the method of the Science Masters":

"(1) That he begins in a state of perplexity.

"(2) That he works with an intense enthusiasm because this perplexity is the result of a real, pressing, vital difficulty.

"(3) Once the difficulty is clearly defined his enthusiasm carries him to a solution by a process which is automatic but which can be described as:

"(*a*) A process of rapid suggestion, supposition, guess, hypothesis, or theory — pending further evidence. (*b*) 'Reasoning out' the implications of each suggestion. (*c*) Deliberately and cleverly arranging conditions in accord with the requirements of any of the suggestions to see what results occur and to weed out the false suggestions.

"The superiority of such an analysis over one which sets up certain definite steps lies in its implications for the teacher. The whole of life can be thought of as a series of problems or hurdles, the series progressing from the simple needs of childhood to the intellectual needs of the educated adult. This line of growth cannot be short-circuited, for each step is prerequisite for each succeeding one. The teacher's task becomes simple and yet difficult; simple, because he must merely commence the process by so controlling the situation that a need or problem will arise for the child — the rest, within certain limits, are the capacities of the child; and to properly gauge these and take them into account requires teaching ability of a high order.

"The great evils of the science teaching of to-day are due chiefly to the adherence of science teachers to a false analysis of the method of the scientists. The

formal logical steps of Bacon or Mill or some of the other metaphysicians attack the problem from the wrong end, as far as the educator is concerned. It is Dewey's analysis of thought which I have attempted to apply to the work of the scientists that I believe will solve the problem of science teaching."[1]

Another statement by Woodhull is pertinent to this discussion:

"A project, or problem, differs from and is superior to a topic in that (1) a project originates in some question and not in such a logical sequence of ideas as may be found in codified matter. In teaching from the so-called 'logical' texts one wrongly attempts to induce the pupils to accept topics as their own projects. Logical organizations of such material as functions in life will be the final result of a protracted study of projects. (2) The project involves the active and motivated participation of the pupil in carrying it out. It does not, therefore, like the topic, lend itself to didactic, formal treatment in which the teacher does all the thinking and the pupil passively absorbs. (3) Projects furnish a basis for the selection of facts according to value or significance, topics furnish no such basis for selection. (4) The project seldom ends in a complete, final or absolutely finished conclusion."[2]

J. A. Drushel, science teacher in Harris Teachers' College, St. Louis, Missouri, proposes this definition:

[1] Meister, Morris, "The Method of Scientists," *School Science and Mathematics*, Vol. 18, pp. 743–745, 1918.

[2] Woodhull, John F., "The Aims and Methods of Science Teaching," *General Science Quarterly*, Vol. 2, p. 2, November, 1917.

"A project is a concrete problem outlined sufficiently fully and clearly to enable the student, for whom it is designed, to carry it out."[1]

Another definition of a school project has been formulated by J. A. Randall, Department of Physics, Pratt Institute, Brooklyn, New York:

"A problem the solution of which results in the production of some object, or knowledge of such value to the worker as to make the labor involved seem to him worth while."[2]

The definitions proposed in the field of science agree in that the project involves a problematic situation; in fact, Woodhull does not differentiate between the project and the problem, but Randall and Woodhull alone lay emphasis on carrying the act to completion. Randall makes no provision for the natural setting of the problem. The situations outlined by Mann and Woodhull may be properly classed as multi-problems,[3] by Drushel as applications, while Randall's definition covers most of the elements which have been considered essential to the project, with the exception that the natural setting for the problem is not specifically indicated.

[1] Drushel, J. A. Definition sent to writer by Supt. John W. Withers, St. Louis, Mo., March 23, 1918.

[2] Randall, J. A., "Project Teaching," Proc. N. E. A., p. 1010, 1915.

[3] Multi-problems will be discussed and defined in ch. iv.

(d) *The Use of the Project in Industrial Education*

The use of the project in industrial and vocational education has been developed by C. R. Allen and defined as follows:

"In the simplest and most general sense in which the term can be used, a project is a problem involving the discharge of a responsibility on the part of a given individual or group of individuals. It requires an intelligent application of knowledge or an exercise of skill, or both, in order that something may be accomplished."[1]

This takes into consideration in a general way the elements which our proposed definition considers. However, attention must be called to the fact that there is seemingly undue emphasis placed on the application of knowledge and principles rather than on the development of principles as needed in the prosecution of the solution. To give undue emphasis to this phase would mean that Allen's definition of project is nothing more than the description of a practical application. Allen in another statement, however, indicates that his term "project" means more than this.

"In the field of vocational education the meaning of the term project becomes still more specific, in that it implies that the 'core' of the project lies in the field of the 'shop experience.' The project is built up

[1] Allen, C. R., "The Project Method and the Combination of the Project Method with the Phase System of Trading and Promoting." Massachusetts Board of Education, Bulletin 75, p. 46.

around doing a job. Any job assigned to a boy in the machine shop may be made the center of requirements which will call upon him to deal with 'elements' representing the entire program of that department.

"If, instead of merely having him do the job as a purely production problem, we ask him in connection with the job to find out why he is using a certain kind of steel on that job, that is a lesson in materials of trade. If we ask him to figure his cutting speed, that is a problem in mathematics. If we ask him to find out how the power is transmitted from the speed pulley to the cutter spindle, that is a problem in relatable mechanics or science. If we ask him to find out whether before there were any millers this particular job would have been done at the bench with a file or with a saw, or whether it could have been done at all, that is a lesson in the history of that trade. If we ask him to figure out the cost of his stock, we have a related problem in applied arithmetic. If we ask him to use a time card, or fill out a stock order, we are giving him a lesson in shop management. It is possible to organize the requirements around any piece of shop work in the case of an individual pupil that small portions of any or all of the subjects to be included in his equipment will be represented in that pupil's experience in connection with that particular job, and that those necessary portions of all or any of these relatable or trade technical subjects will be brought to his attention at a time when they function directly and immediately upon the work in hand. When this is done, we say the boy is working on a project, and this method of instruction is called the project method.

"In order that projects may serve a progressively

educational purpose they must be so organized as continually to present new difficulties and offer new opportunities for achievement. For example, when the 'milling project' just discussed makes no demands on the boy for the acquisition of new knowledge, if he already knew how to take a rough cut on a miller, and could correctly solve the related problems included in the project, we would still have a project, but not one involving the acquisition of new knowledge.

"The project as used purely as a device for training the pupil in selecting and applying to the demands of a particular job only what he has already acquired, while a valuable device, is not the type of project discussed here since it lacks the element of requiring the pupil to determine intelligently needs for additional knowledge required to carry out that particular project, and to secure such additional knowledge as a prerequisite to completing or carrying out the project in hand."[1]

From the foregoing quotation it becomes evident that Allen lays great stress on the priority of a problem over the statement of principles. As he states later:

"If, however, it is desired to use the project to impart additional knowledge then it is evident that the project must be so arranged that the pupil will acquire his additional knowledge just at the time when he needs it to carry out that particular project."[2]

[1] Allen, C. R., "The Project Method and the Combination of the Project Method with the Phase System of Grading and Promotion." Massachusetts Board of Education, Bulletin 75.

[2] *Op. cit.*

The definition proposed and outlined by Allen is very comprehensive, in that it includes review project as well as instruction project.

(e) *The Use of the Project in the Field of English Instruction*

The adaptation of the project idea to other fields is rapidly receiving consideration. In the teaching of English literature and composition, J. F. Hosic has made use of the term. The following gives in detail his characterization:

"I understand by project a complete unit of experience. The essential aspects or elements of an experience are, in the simplest form, a situation and the response to it. This, however, will not describe adequately what is meant by the type of experience called complete. Such a unit includes the following phases: situation, problem, purpose, plan, criticism of the plan, execution, judgment of results, appreciation. This is, of course, not a chronological order strictly speaking, as a feeling of appreciation will spring up in anticipation of the outcome, while on the other hand, purpose persists and plan is modified to the very end. Negatively, the project is not to be confused with mere problem, with motivation, with incidental learning, with correlation, with self-activity, or with the idea of general method as illustrated by the Herbartian 'formal steps.' To understand what the project method is we have only to go out into life and study any case of purposeful living. Perhaps, then, the word purposeful should be added to the

original definition of a project — a complete unit of purposeful experience. This will distinguish the project method from ordinary habitual reaction, as thinking, planning, criticizing, etc., are essential. I may add that the results to flow from the project will include growth in initiative, in power to think, in judgment of values, and in appreciation, as well as in concentration and power of organization, at least within the range of specific suggestions in which the experience functions. So far as these results are general that result will be secured by observing the laws which govern the conditions of transfer."[1]

This characterization provides for reasoning as against the memory of information, for in the unit of learning he includes situation, purpose, plan, criticism of the plan, execution of the plan, judgment of results, and appreciation. In carrying out this unit new situations would arise which would demand reasoning. Since the unit of experience provides for execution, it contemplates carrying the act to completion. In another summary, the author indicates that the project is "an organization of school life in accordance with life in the home and community," hence a natural setting for the problem is provided. In comparing the project with a purposeful activity in life he seems to favor the priority of the problem over the statement of principles, although this is not specifically stated.

[1] Hosic, J. F. Statement sent to writer in letter, March 20, 1918.

(f) *Use of the Project in Elementary School Instruction*

The adaptation and use of the project in the primary and elementary grades is becoming an increasingly important subject of discussion. Effort is being made by educational administrators, supervisors, and teachers to develop a curriculum whereby provision will be made for the pupils to continue their normal activities in school. The project idea as defined and illustrated seems to meet this need.

One of the most comprehensive and interesting books showing the use of the project in elementary grade work has been written by Miss Krackowizer.[1] The purpose of the book as stated by the author is:

"To break down the artificial barrier between first grade and kindergarten; to do away with much of the formalism and mechanism of the early grades; to have the child continue in as normal a way as possible those life activities in which he is engaged outside of school; to do this in a manner which will best further his adjustment to new activities in which he takes part; to make the child increasingly intelligent, and much more active in his response to his environment."[2]

"Any 'purposeful activity' determined upon and carried to a successful conclusion becomes a project."

This definition provides for the act being carried to completion. In fact, the completed act is an essential

[1] Krackowizer, Alice M., "Projects in the Primary Grades." J. B. Lippincott, Philadelphia, 1919.

[2] *Op. cit.*, p. 7.

element of the definition. Although the natural setting is not clearly provided for in the definition, nevertheless the illustrations and descriptions which the author gives leave no doubt in the mind of the reader that the natural setting is an essential factor in the definition. These citations are pertinent.

"Projects of all kinds, involving play, social experience, nature experience, constructive activities, are part of the child's daily life, long before he enters school; they should continue as parts of his daily life under normal conditions while he is in school." [1]

"The plea is merely for a unified life at school, where each activity shall take its legitimate place, with changing emphasis on the various elements, according to the greatest need at any given time. Social and nature experience, play, constructive activity, literature, reading, writing, and the rest must form the ingredients of each daily, weekly, monthly program. It is the teacher's task so to select and adjust conditions as properly to balance the ingredients so they will mutually help one another. This means that conditions will confront the children in the most 'true-to-fashion,' and will be met by them as a life to be lived, rather than as a task to be performed because arbitrarily imposed." [2]

Not only does Miss Krackowizer make provision for the act but also for the problematic act:

"All . . . projects include the problem type in so far as they are not merely unconscious responses. The

[1] Krackowizer, Alice M., "Projects in the Primary Grades," p. 9.
[2] *Op. cit.*, pp. 8–10.

process of carrying out projects . . . includes thoughts, suggestions, and activities rejected as well as those finally selected as pertinent."[1]

The teacher who plans to utilize the project as a method of teaching and a method of curriculum organization will find this statement of Miss Krackowizer helpful. It will aid the teacher in understanding and interpreting the project idea and applying the principles to daily schoolroom practice,

"if he will look for illustrations referring to 'purposeful activity' of the children, and to the working back and forth in helping fashion of the various elements of the school curriculum. Such cross references occur in: The caring for pets, which involves play and labor; the dramatization of literary gems, the representative play in connection with social and nature experience; the constructive activities carried on in response to social demands; the reading, writing, and number done as the result of living social lives."[2]

V. Summary

This chapter has shown that the types of teaching which have been analyzed and discussed in Chapters I and II are, without modification of meaning, inadequate to take care of the situations designated as projects.

The term "project" was first used by the United

[1] Krackowizer, Alice M., "Projects in the Primary Grades," p. 17.
[2] *Op. cit.*, p. 11.

States Department of Agriculture as an outlined plan for carrying on a piece of coöperative work. The designation "home project" was used in 1908 in connection with agriculture in the secondary schools by Stimson and others.

The definition of the project which is proposed is the following:

A project is a problematic act carried to completion in its natural setting.

This definition provides for an act carried to completion as over against the passive absorption of information, and for the development of the problematic situation demanding reasoning rather than merely the memorizing of information. By emphasizing the problematic aspect it implies the priority of the problem over the statement of the principles and it makes provision for the natural setting of problems as over against an artificial setting.

An analysis of the definitions of projects by teachers of general educational theory, agriculture, science, industrial education, and English in primary and elementary grades, shows wide variations in meaning. Most of the definitions make provision for the problematic act and few for carrying the act to completion. Although the natural setting for the problems is frequently implied, it is seldom specially stated or discussed.

The question that must be answered in determining whether the setting is artificial or natural is this: Is

the problem, which is demanding solution, different, due to the fact that it is undertaken in school, from what it would be were it to arise in life outside the school? In other words is the problem presented for solution by schoolroom practice essentially different from that found in life outside the school? If the solution is carried on in the same way in school then the problem has a "natural setting" even though it is being solved in school.

The provision for the natural setting of the teaching situation is the distinct contribution of the project method. Without the natural setting there is no project.

CHAPTER IV

PROBLEMS AND PROJECTS

I. The Need for Making a Distinction between Project and Problem

A critical study of the literature on the project method, as applied particularly to the teaching of the arts and sciences, shows that no clear-out distinction has as yet been made between the project and the problem method of teaching. Woodhull, for instance, in a recent article discussing the methods of science teaching makes none, and, indeed, it would be quite fair to interpret him as using the terms synonymously, for in comparing the project or problem with the topic it is clear that he used the terms interchangeably. Again in the same article he states:

"The present need of the schools is for a large collection of sample projects, or problems which may be used in showing teachers in a given community how to devise and utilize projects adapted to different grade pupils in their own environment."[1]

[1] Woodhull, John F., "The Aims and Methods of Science Teaching." *General Science Quarterly*, Vol. 2, p. 250, November, 1917.

In continuing the discussion, Woodhull quotes the characterization of the project made by C. R. Mann, which, as stated before, may be considered to be a multi-problem.

There is a tendency, too, on the part of some writers, to use an expression which will not make it necessary to separate clearly and distinctly the terms "project" and "problem." The expression which is used is the "*problem-project* method of instruction."

Hosic uses the term "problem-project" to describe certain teaching situations which for the present writer would constitute projects. Hosic would consider the term "project" adequate if it were not so closely identified with certain shop and laboratory practices. The term "problem" he believes is inadequate because it suggests a purely intellectual process. The "problem-project" appears to be more satisfactory because this compounded term emphasizes both thinking and doing, and points to an objective result.

The writer is in sympathy with Hosic's effort to include in the concept "project" the idea of a problem. It is rather unfortunate, however, that this was done by the use of the term "problem-project" because of the usual confusion in the use of these two terms. Hosic does not confuse the meanings; neither does he use them synonymously. The teaching situation which he describes as the problem-project is designated as the project by the writer. Hosic's use of the term "problem" is identical with the writer's, to be described later.

In a recent article on the problem and project method, H. G. Lull makes no effort to present a clear-cut distinction between these two terms. He makes the point, however, that Kilpatrick "holds that problem instruction is a special case of project instruction." The following statement by Lull indicates that he recognizes some difference in meaning between the two concepts.

"Alternative suggestions arise in the case of the problem as to whether one means or another shall be chosen to relieve a difficulty or to reach a definite end. Or it may be that the choice of an end is in doubt. In either case, there are perplexing difficulties, and before a choice can be safely made, there must be further investigation. Finally, at least a tentative choice is made of a certain line of procedure or of a certain end to work for, and the work proceeds on the basis of this choice until it is shown to be leading the wrong way. Again, the problem is predominately a matter of explanation or interpretation while the project is in the main a matter of planning to do something and doing it."[1]

Since there seems to be no sharply drawn distinction between the project and the problem as interpreted by some of the leading advocates and writers on the project method, it will be necessary, for the sake of clarity, to set up definitions which may make it possible to distinguish these two terms.

[1] Lull, Herbert G., "Project-Problem Instruction," *School and Home Education*, Vol. 38, p. 79, 1918.

II. Definitions of Problem and Project

The definition of the problem as proposed by John Dewey is quite adequate:

"Every conscious situation involving reflection presents a distinction between certain given conditions and something to be done with them; the possibility of a change. This contrast and connection of the given and the possible confers a certain problematic, uncertain aspect upon those situations that evoke thought. There is an element, which may be slight or which may be intense, of perplexity, of difficulty, of confusion. The need of clearing up confusion, of straightening out an ambiguity, of overcoming an obstacle, of covering the gap between things as they are and as they may be when transformed, is in germ, a problem."[1]

The definition of the project which the writer proposed and discussed on pages 43–54 may be considered again here in connection with its relation to the problem. The project as defined is a problematic act carried to completion in its natural setting.

The term "problem" is largely "intellectualistic in its connotation" and if it were used exclusively it would have a tendency "to overemphasize the intellectualistic aspect of school work."[2] The project, on the other hand, lays emphasis not only on the problematic situation but also on the act and on the possibility of

[1] Dewey, John, "Problem." Monroe's Cyclopedia of Education.

[2] Kilpatrick, W. H., "How Shall We View Method?" (Unpublished article.)

carrying it to completion. The project makes provision for the natural setting of the teaching unit. Without the natural setting there is no project. The problem setting may be artificial, that is, it may not approximate a life situation. The project is a normal life situation, or the problem in its natural setting.

The foregoing view is indicated by Kilpatrick in the following statement.

> "It is at once evident that every problem which is accepted for prosecution in the sense that its solution is willed *ex vi termini* is a project. In this sense every real problem is a project, but every project is not a problem; the problem method accordingly becomes a special case — a most important one, to be sure — of the project."[1]

This same view of the project and problem is shared by Miss Krackowizer:

> "Children's lives are full of activity. They are constantly carrying out projects and solving problems of their own. In the process of living they learn to think, because of the fact that in their activity they are most often carrying out a definite purpose; that in order to do so they must weigh and judge among ideas and material details and select from among these the ones most pertinent to the fulfillment of their immediate end; that in working out their definite purpose, they meet difficulties which need to be overcome before the desired end can be obtained.

[1] Kilpatrick, W. H., "How Shall We View Method?" (Unpublished article.)

"Since this is the method of procedure of a normal child or of any normal human being when under no constraint, the school should adopt it. 'Purposeful activity' on the part of the children then becomes the aim of the school. The teacher's part is to guide towards such 'purposeful activities' as will prove of greatest benefit to the children, choosing among those directly available for first-hand experience."[1]

The following definition of the project is proposed by Miss Krackowizer: "Any 'purposeful activity' determined upon and carried to a successful conclusion becomes a project." She defines the problem as the situation which demands the "exercise of choice."

The writer uses the expression "natural setting for the problem" in the same sense that Kilpatrick uses "real problem." In the writer's definition of project the term is made to include the problem stated as the problematic act. It is quite clear, then, that the project must include a problem.

The apparent difficulty in defining the fields of the project and problem is just what might be expected when the less inclusive term, "problem," covers a large part of the field taken by the more inclusive term, "project." The problem does not make any provision for the natural setting of the teaching situation, while the project does. To make a sharper distinction, we may state that the project differs from the

[1] Krackowizer, Alice M., "Projects in the Primary Grades," pp. 15–16. Lippincott, Philadelphia.

problem, in that it involves action in its natural setting. The project carries with it the implication of doing, the problem suggests primarily an intellectual process.

The distinction between problems and projects is well stated by Miss Krackowizer:

"The progress of carrying out projects and problems includes thoughts, suggestions and activities rejected as well as those finally selected as pertinent. If no steps are taken toward the attainment of a definite purpose, the mental problem may remain in the child's mind, but there is no solution of it and there is no project involved."[1]

III. Types of Problems and Projects

(a) *The Manual Problem and the Manual Project*

It should be remembered, however, that the problem is not necessarily confined to the intellectual process. It is quite possible to have problems involving manipulative skill, even physical activity, and yet these may not be considered projects. The following example will illustrate. In introducing the subject of baking powder in a chemistry class, the teacher had the students make tests to determine the amount of carbon dioxide given off by equal amounts of the different brands of baking powder. The whole lesson proved

[1] Krackowizer, Alice M., "Projects in the Primary Grades," pp. 16–17. Lippincott, Philadelphia.

interesting and the results were probably better than those of the average laboratory experiment. The students carried out their problems and later purchased different brands to repeat the experiment. But while this exercise may have been effective, it was a problem (we could well term it a manual problem) and not a project, since the setting was artificial.

One of the boys, however, suggested that it might be interesting to determine which brands were economical. Several of the boys and girls then tested the baking powder used at home and compared results with those obtained in the experiment. They then reported to their mothers the efficiency of the different powders and this resulted, in some cases, in a change by the mother in her purchase. This latter exercise is a project, for it arose in the natural setting, *i.e.*, the desire to help or give advice to the mother, and the act was carried to completion in its natural setting. This may be termed a manual project.

The manual projects are common in the fields of general science, agriculture, home economics, and manual training.

(b) *The Intellectual Problem and the Intellectual Project*

Again, it is not necessary that there be physical activity in the project, that is manual activity. While it is true that physical activity is usually considered a part of the project, yet mental acts may constitute "activity." In a course in the "History of Western

Europe" the teacher suggested that the events of the Great War should be followed. One student noted in his reading the frequent references to the proposed reëstablishment of Poland as an independent nation. He asked the teacher, "Why should this particular country be set up?" The teacher replied that this would be a good problem for him to solve. As a result he read widely, looked up references, and was able to give an accurate account of the three divisions of Poland.

This problem arose in its natural setting — the situation was not essentially different because it was solved in school; it was a problematic act carried to completion in its natural setting. This may be termed an intellectual project.

(c) *Illustrations*

Four types of projects and problems have been mentioned, the manual problem, the intellectual problem, the manual project, and the intellectual project. An illustration of each of these types will be made from the same field of subject matter in order to show clearly their differences.

The subject matter may be centered around the study of the electric bell. If the topic were begun by making an assignment in the text, the student being required to master the lesson as assigned without regard to the natural setting for the problem, it would be an *intellectual problem.* If he were to perform the experi-

ments as outlined and directed in the physics manual, even doing some construction work, this exercise would be classed as a *manual problem.* These are " problems " because difficulties arise and are solved. They are not " projects " because the " natural setting " is lacking.

The student might become interested in electric bells, burglar alarms, and the like, and take up the subject seriously, reading widely in order to familiarize himself with the details of the bell. He might do this in the same way and for the same purpose as one would who should consider such a problem outside the school. The teacher might set the stage for such purposeful activities. This method of approach illustrates the *intellectual project.* If this exercise were carried to the point where a bell system or a burglar alarm system was installed, perhaps in the home, the total activity would represent the *manual project.* These are projects because difficulties arise and are solved in a natural setting; that is, the situation is not essentially different from a " life situation."

The two types of projects are recognized by Miss Krackowizer in the following quotation:

" There are various types of projects. One of these types involves mental processes alone, without manipulation of material and without the necessity of outward expression; this is the problem type. It goes without saying that, while this type may exist by itself, it is not likely to do so in the child's world. On the other

hand, all other types of projects include the problem type in so far as they are not merely unconscious responses."[1]

It must be borne in mind that the manual problem and the intellectual project are the two concepts which may cause confusion in making the distinction between projects and problems. The first step is to determine whether the natural setting for the problem exists. If so, the teaching situation is a project.

What is frequently done in school is to take problems away from their setting in projects, with the resulting tendency to teach them in isolated groups with little thought of their function. To avoid this isolation of elements, a larger unit of work, the project, is undertaken on a functional basis and carried over into activity.

It is interesting to note that both problems and projects vary widely in the degrees of complexity. The boy who oils a bearing or the boy who determines the efficiency of the dairy herd is, in each case, carrying out a project, but the complexity of the latter is far greater than that of the former. Again the problems vary in complexity. For instance, the finding of the product of 3×6 is less complex than the determination of the relative superiority of the harbors of New York and San Francisco.

[1] Krackowizer, Alice M., "Projects in the Primary Grades," p. 16.

IV. Classification of Problems and Projects Based upon Degree of Complexity

Since there is such a wide variation in the complexity of the problems and the projects and since there are so many situations which these concepts cover, the following subdivisions indicating this degree of complexity are suggested:

Problems may be classified as (a) *Simple problems and* (b) *Multi-problems. Projects may be classified as* (c) *Simple, and* (d) *Complex.*

(1) *Simple Problems and Illustrations*

The simple problem has its place in school. There are many intellectual difficulties that are not complex and yet need to be solved. The teacher may ask such questions as, "Where is Louisiana? What city is its capital? Its resources? Where is Alabama? Its capital?" etc. The teacher may ask a number of simple questions concerning the states in the Southern group, and since they are in a sense difficulties proposed for solution, they may be considered as simple problems.

But, instead of proposing for solution a number of these simpler questions, the teacher may propose one large problem, which we call the multi-problem, and which may embrace all these simple problems. Instead of asking many detailed questions about the New England States and the Southern States a "multi-problem" might be suggested such as the following:

Compare the two groups of states in respect to size, location, surface, population, industries, harbors, agricultural activities, and labor. Or again, — Is the Southern group sufficiently large to make a strong nation? Is the New England group?

(2) *Multi-problems and Illustrations*

There are many simple problems that could be proposed for solution in the suggested study of the two groups of states. But in the multi-problem attack, some one complex problem which will involve most of the materials and facts covered by the simple problem is selected.

For instance, a superintendent proposed in the geography classes which were studying New England this question: "Might New England have developed into a powerful, independent nation?" Several problems arose and all the facts usually taken up by the topical method were utilized. The first minor problem was this: "Is New England large enough?" A pupil turned to the appendix of the geography, found the area of the United States, of his native state, and of New England, and decided in the negative, — New England was too small.

"But how does it compare in size with some great European nations?" was the question proposed by the teacher.

The children named several important European countries, and finally selected for study the British Isles and particularly England. Comparisons of area were made.

The teacher then put the problem: "As far as area is concerned, might New England have been a nation? Is New England large enough to become a nation?" The class then reversed itself and decided for the affirmative.

Then the question was put: "Greenland is twelve times the size of New England. Is it a great nation?" The pupils decided that size was not all-important and that they must know whether or not the people could raise what they needed to eat, and to know this they must get facts about soil, seasons, surface, and climate.

A study of soils was made and a study of the other items of seasons, surface, and climate followed. Before the books were opened, the children were always asked to hazard opinions about the probable nature of soils, seasons, etc. (This took much time because of comparisons made with their native state.) They decided that New England could not feed itself, and also, after protracted study, that New England could not clothe itself. It, therefore, could not become a great nation — so the pupils reasoned.

"But can England feed and clothe itself?" The study revealed that it could not. "But since she is a great nation, how is this overcome?" By trade.

"What could New England trade (from your knowledge of New England already learned)?" Products of fisheries, mines, forests, etc.

"Does New England have more fish than it needs for its own use?" A study of fisheries followed and the question was answered affirmatively. So, also, was carried on a careful study of mining, lumber-manufacturing, etc. In each case the children formed their judgment and verified their conclusions.[1]

[1] Charters, W. W., "Systematic Topics, Multi-problems and Projects." Proceedings Illinois State Teachers Association, 1917.

A Multi-problem in Art

Another multi-problem, one in the field of art, may be cited. It was outlined and carried out in the seventh and eighth grades in Grand Rapids under the supervision of Miss Charlotte Calkins. The topic of the two years' work was called "The House Beautiful."

The problem took up all phases of making the house beautiful, — the selection of the lot, making plans of the house, involving the principles of design, and finally the study and selection of furnishings.

In the two years during which this study was carried on the pupils were brought in contact with most of the problems that arise in making the house beautiful.

It may be said, parenthetically, that for most of the pupils this was a school problem, but to some of the pupils it became a project. One such project was called to the attention of the writer. A girl's mother was planning to redecorate and refurnish the house. The girl, aided by the supervisor, took charge of the undertaking, and, in carrying the task to completion, developed principles as she needed them. This is, of course, splendid teaching, for it applies principles of art in a very concrete, interesting, and almost spectacular manner. The work as carried on by Miss Calkins may be classed as a multi-problem. Instead of asking the pupils to solve many detailed and simple problems of art, the large multi-problem, "The House Beautiful," was suggested. There were many simple

problems and projects involved in this one large multi-problem. It is classed as a problem because it was not in most cases carried to completion in its natural setting.

A Multi-problem in Arithmetic

Another interesting multi-problem in the field of arithmetic is reported by Clark as an illustration of the project or problem-project. The problem was the mathematics and business practice involved in buying a lot and building a house. Such subjects as legal descriptions of real estate, taxes, building costs of different materials, borrowing money, mortgages, insurance, were studied in connection with the many mathematical problems. This is an interesting method of approach but should not be called a project or a problem-project because the setting is not natural, there is an artificiality about it. This is a valuable exercise and should be given wide publicity. For the sake of clearness, however, it should not go under the name of project.[1]

A Multi-problem in Geography

A significant multi-problem in geography was carried on by Miss Williams in an eighth grade at the Kansas State Normal School. The problem was "To show why the trade of New York is greater than that of San Francisco." The problem was investigated by

[1] Clark, J. R., "The Problem-Project in Arithmetic," *Chicago Schools Journal*, Vol. 1, pp. 15, 16, 1918.

all the pupils, each preparing an outline and suggesting methods of procedure. The things needed in solving the problems were suggested:

"1. The value of trade in money and quantity of trade in tons.

"2. Description of the two harbors.

"3. Position of the two cities with reference to our country, to foreign countries.

"4. Articles of trade."

The various points were discussed in class, references were reviewed, and finally a series of conclusions was prepared and adopted by the class.

This is reported as a project-problem, but owing to the fact that there was no provision for the natural setting, it is more accurately classed as a multi-problem.[1]

(b) *Simple and Complex Projects*

Not only are there simple problems and complex problems, but in like manner there are simple and complex projects. The girl who accepts the problem of peeling potatoes economically at home may be said to be carrying out a simple project, but her task is much less complex than that of the girl who undertakes as her project the entire preparation of the meals for the family for a period of a month with par-

[1] Williams, Jennie, "Project Problem Instruction in the Eighth Grade Geography," *Teaching*, No. 45, pp. 11–15. A Journal published by Kansas State Normal School, Emporia, Kansas.

ticular attention to the reduction of cost. The latter is a complex project.

Obviously, it will be very difficult to draw an exact line of demarcation between the simple and complex problems and projects, but this guiding principle may be posited. When the process has sufficient complexity to be broken up into a number of problems or simple projects, it may be classed as complex.

The classification of projects into simple and complex is recognized by C. R. Allen:

> "'Projects' may include major and minor projects, the latter being a subdivision of the former. For example, a boy might undertake to raise an acre of corn as his major project. A minor project connected therewith would be the preparation of the soil or the test of the seed." [1]

In order that the proposed classification will be better understood, a number of simple and complex projects will be cited.

(1) *Simple Projects and Illustrations*

Such tasks as sharpening tools, cutting to a line, planing a board, and fitting a joint in the manual training class when carried on in a natural setting may be considered as simple projects. The baking of a loaf of bread, setting the table, serving the meal, and going

[1] Allen, C. R., "The Project Method and the Combination of the Project Method with the Phase Method." Massachusetts Board of Education, Bulletin 75, p. 50.

to the meat market to procure a certain cut of meat may be called simple projects in home economics. Making an analysis of soil, testing varieties of seed corn, spraying fruit trees with a given mixture, keeping a milk record for a week, selecting and preparing seed potatoes, developing plans to remove surface water around farm buildings, treating seeds with formalin, introducing a plan for proper feed rations for domestic animals, if carried on in the natural setting, are representative for agriculture. In art, framing a picture according to principles of design, making curtains, selecting artistic but inexpensive wall paper, illustrate the simple project.

In composition, writing an invitation, a report of a recent athletic game for the school paper, or a letter illustrate the simple project in composition.

In arithmetic, solving simple problems which arise in connection with some of the home activities, such as checking over the weekly grocery bill, illustrate the simple project.

(2) *Complex Projects and Illustrations*

A complex project differs from the simple project only in the degree of complexity. As stated previously it is difficult to draw a sharp line between the simple project and the complex. To illustrate the point a little more fully, projects might be arranged in the order of complexity beginning with the least complex and ending with the most complex suited to school

conditions. The complex projects would consist of the projects in the upper half of this group. At the point in the scale where the projects were sufficiently complex to be broken up into smaller problems and projects, that point would, in general terms, mark the beginning of complex projects.

Complex Projects in Agriculture

A number of projects outlined by Stimson in his bulletin on "The Massachusetts Home Project Plan of Vocational Agricultural Education" illustrate the complex project. The project of constructing a concrete walk might involve a study of the nature of cement; its action on sand, gravel, and broken stone; its weather-resisting qualities; the seasons in which it might be used; the cost as compared with plank, brick, flagging, and asphalt; the mathematical determination of proportions of sand, cement, and stone to be used; the geometrical determination of the sections into which it should be divided, and whether it should be crowned or flat; the geographical sources of the raw material and the commercial conditions for purchasing the cement.

"The home project, or part-time plan of instruction, moreover fits in nicely in its relation to the usual farm activities of the boy. The boy may help with the milking throughout his course, where the object is to get the cows milked as quickly as possible and where no records are kept. During certain months of at

least one year the school should require whatever time may be necessary for keeping an accurate record in pounds and ounces of the yield of a part of the herd. This may be limited to the weighing of milk from a single cow and giving credit for what she produces." [1]

The complex project in agriculture is well illustrated by French under the name "long time projects." [2] Such projects as raising an acre or more of corn, taking charge of an entire vegetable garden, or apple orchard, or the poultry for a season, give the scope of complex projects suggested by French.

The student in a class in Modern History who became interested in the map of Europe and decided he would account for the present map undertook a complex project.

A Complex Project Centering around the Parcel Post

A very complex project centering around the parcel post, by C. W. Stone, will be summarized. It has been thoroughly developed and cuts across many subjects in the curriculum. It will serve as a good example of the project worked out fully.

Since the children plan at the holiday season to send packages to distant friends and relatives they naturally

[1] Stimson, R. W., "The Massachusetts Home Project Plan of Vocational Agricultural Education." U. S. Bureau of Education, Bulletin 579, pp. 13–15, 1914.

[2] French, W. H., "Home Project in Agriculture for Michigan High Schools and School Credits," Michigan Agricultural College, Bulletin No. 17, 1916.

consider the various ways by which they may be sent. This gives a natural motive for the study of the parcel post a few weeks before the holidays. This project was undertaken by the fourth grade class in the Iowa Teachers College Training School. "The main purpose was to bring the subject before the children in such a way as to prepare them to use the parcel post service to the best advantage. Accordingly, it was worked out not only through general discussions in which the entire grade took part, but also in their class work in handwork, geography, arithmetic, and language."

The available experience which the children had for this project was ability to read and write; a knowledge of simple mathematics, including measurements, some knowledge of places in relation to their own locality; ability to do elementary manual work; they had received packages by parcel post and had seen the parcel postman delivering packages.

"The main aims which the teacher had in mind were (1) to teach the children how to wrap and address correctly packages to be sent by parcel post, (2) to teach them what might or might not be sent by parcel post, (3) to teach them the advantages of parcel post service, (4) to give them practical problems in arithmetic, (5) to make a beginning of map reading by locating the places to which packages were to be sent, (6) to give them a larger conception of civic life, (7) to train them in obedience to laws and regulations, and (8) to teach them to help other people.

The rules and regulations of sending packages by parcel post were worked out by the pupils and teacher, the larger part was suggested by the pupils.

The technique and practice of wrapping packages

was carried out in the handwork lesson. Here questions as to the cord and paper to be used and the methods of wrapping different types of articles were developed. Each child selected an article and wrapped it, developing principles as needed. The addressing of the packages with its problems was done in the language class and the study of the parcel post zones was carried on in the geography class. In the arithmetic class the children were taught to weigh and compute the cost of sending their packages to different zones. After computing the cost, the packages were taken to the postmaster, each member in turn acting as postmaster, to purchase stamps. The postmaster then weighed the package, looked up the zone, computed the cost of sending the package, returning the change to the pupil. This work furnished material for practical problems in arithmetic.

Some of the children actually sent packages which they had wrapped in class, thereby testing the results of this exercise.

The package which furnished the greatest interest was the one prepared for an orphans' home. The children brought toys from home and made others in the manual training class for the gift. The preparation of this package, the wrapping, packing, and addressing constituted one class exercise. A letter written by one of the members of the class was included, requesting one of the children receiving the package to answer. Since this letter was chosen as the best by a committee it furnished competition, a motive, for the writing of the letter.

"This study of the parcel post has given the children a practical knowledge which will enable them to render assistance at home whenever the need of sending

a package by parcel post may arise. It has been a socializing influence. It has made them more observant of civic relations and has opened their eyes to the possibility of their being able even as children to bring pleasure to others. The whole series of lessons furnishes a good example of the kind of school work which is a part of actual everyday living." [1]

A Complex Project in Physics

In a high school physics course, the writer taught the principles and uses of the electric bell by the project method. Each year one or more of the school buildings had to have the bell system completely overhauled, which meant to install new bells, new wires, repair some of the bells, find short circuits, and, in many cases, make parts for bells or construct complete new ones. This project was discussed by the members of the class and leaders were appointed for each phase of the work. The principles of the electric bell were developed as needed in this task. Usually this experiment resulted in bell systems being placed in the homes.

It will be seen that the complex projects proposed have been of sufficient complexity to allow them to be broken up into problems and simple projects.

V. Summary

It may be restated that the project is a problematic act carried to completion in its natural setting. It

[1] Stone, C. W., "Parcel Post Project."

differs essentially from the problem in that it provides for the natural setting of the teaching unit and lays emphasis on the manual act.

Problems may be classified as (1) intellectual and (2) manual.

Projects may also be classified as (1) intellectual and (2) manual.

On the basis of complexity, problems may be classified as (1) simple and (2) multi-problems; projects may be classified as (1) simple and (2) complex.

The multi-problem gives superior training in developing the technique of reasoning and "tends to make facts interesting and significant." The project, particularly the complex project, in addition to developing the technique of reasoning, provides the natural setting for problems and carries facts into action.

Making provision for the natural setting sometimes may be uneconomical. If so, the problem method is advisable.

CHAPTER V

IMPLICATIONS OF THE PROJECT METHOD OF TEACHING

I. The Project and Motivation

The definition of the project includes the natural setting of the problem. This means that the problem has more significance for the learner. The natural setting of the project makes provision for a strong motive. The testing of seed corn for the father's or for the boy's own corn crop is more interesting than testing seed corn as a formal laboratory exercise. Testing the baking powder for the mother is connected with more interests than carrying on this test as a laboratory experiment. The class in school hygiene which makes a sanitary survey of the town with a view to improving health conditions works on a project which is connected with more interests than the study of the principles of hygiene in a school text. The boy who went to Robinson's " History of Western Europe " to find the reasons why serious consideration is being given to the creation of Poland, probably would have read the history of the three partitions of Poland with

far greater interest had this problem been used to vitalize the usual logical method in history.

A statement by Charters illustrates this point:

"The natural setting provides a strong motive, — canning fruit for the family is more interesting, we will say, than cooking a little fruit in a small laboratory utensil. Treating the mold on fruit 'I have canned for winter use' is more stimulating than studying molds as ends in themselves. Studying sterilization to use immediately in putting up fruit for friends has much more appeal than merely studying sterilization as a class exercise. Tying the process to outcomes and beginnings of a varied and intensely fundamental sort tends to produce a great spontaneous interest. All projects are not interesting to any one student, but if a project is selected so as to be of interest, the degree of the interest is likely to be very high because of the setting in the experience of the student. It is claimed that when the project is interesting, it is very interesting." [1]

The project is able to create interest of a deep-seated sort because the interest comes from associative connections from many sources. The project offers many more reservoirs from which interest may be drawn. If a boy wishes to study or experiment with the method of testing seed corn merely to pass an examination or to make a grade in a certain course, the interest in the test or experiment flows in, or is irrigated from, the

[1] Charters, W. W., "The Project in Home Economics." *Journal of Home Economics*, Vol. 10, p. 117, March, 1918.

grade or examination reservoir. But if, in addition, he is making the test in order to help his father to buy the seed corn economically, if he is planning to grow ten acres of corn from which he will receive a profit, if his own schooling or a trip for his mother depends upon the success of his project, then there are just so many more reservoirs of interest which are tapped by the project.

If the testing of the seed corn is tied up with many more numerous interests than that of merely making a passing grade, then it means a greater amount of interest. The potentiality of interest in projects is great because of their wide and varied connections.

Some teachers in agriculture find that the work done on the plots of ground owned by the school is not capable of arousing the genuine interest of pupils; this is due probably to the artificial setting. When the work is taken up as projects at home and on their own farms great interest is aroused because of the natural setting for the problem. This means that the work on the home farm is tied up with more interests for the boy. The statement from MacHoke bears out this point.

"We find home work giving better results than work of a similar nature on plants owned by the school. Each boy in a daily course is required to keep records of cows on the farm. Farmers are urged to leave samples of milk or products of milk. These are tested by the high school, and reports are made to the farmers

and to the federal dairy department. We are testing sixty dairy cows at this time. More farmers will come in as soon as they have an opportunity to arrange it. We do a great deal of practical work on the farms near, such as pruning, spraying, making butter, oiling harness, judging stock, repairing machinery, growing crops. We are able to arouse deep interest among the pupils only by practical work in bringing subjects home to them, so that they can see the value of taking the course. The course is growing in popularity, and we anticipate large numbers next year." [1]

The psychology of the project seems very simple. Every one works with the greatest effort at the problem in which he is most interested. The project provides for a natural setting which means that it is associated with many interests of the learner. It follows that the projects which are accepted for solution will be highly motivated — they will be worked at with a maximum effort because they hold great significance for the learner. A need for the solution is felt. This idea is implied by Stimson in the following comment on the interest developed by the project method.

"The methods by which the boy becomes on a small scale a farmer or business man for himself gives the project which he is carrying on and the school work in which he participates a reality not otherwise attainable. It heightens measurably his interest in the work and in the related study of the school, and

[1] "Agricultural Teaching." Bulletin No. 601, U. S. Bureau of Education, p. 60, 1914.

must fix better than by any other device the training which he is receiving."[1]

Before concluding the topic of the project and motivation it should be pointed out that projects are not always intrinsically interesting, in spite of the claims made by the advocates of the project method. As Charters indicates:

"Projects may be interesting or uninteresting. There is no divine alchemy in the project. The project may be interesting to one class and not to another. It may be interesting to some children in the class and not to all. It can, of course, be shown that the possibilities of interest are much greater than in the facts learned in topical organization or even in multi-problems."[2]

II. The Project and Thinking

It is unnecessary to take up at any length the importance of thinking. It is more pertinent to present methods by which effective thinking may be attained, and in this discussion to show the relation of the project to thinking.

A brief statement of the conditions which determine and promote thinking is accordingly presented herewith.

Thinking occurs in a doubtful or perplexing situation; it is the establishment of connections between means and ends. "Since the situation in which think-

[1] Stimson, R. W., "The Massachusetts Home Project Plan of Vocational Agricultural Education," p. 15, Bulletin No. 579, U. S. Bureau of Education, 1914.

[2] Charters, W. W., "Systematic Topics, Multi-problems, and Projects."

ing occurs is a doubtful one, thinking is a process of inquiring, of looking into things, of investigation."[1] Mind is active, not passive, and its methods of procedure are experimental.

The value of the project in directing thinking is shown in the following statements.

The student may propose and accept the project of installing an electric signal service in the home. In planning the installation he faces this problem of determining the amounts of material, the cost and initial steps of installation. After he has completed the project he may find that certain bells will not ring, which will cause him to review the whole situation. His problem for the time being will be to find the immediate difficulty and he will go to the individual bell that does not respond to find the trouble. He may resort to his source material and read about the essential parts of the bell; and with this information he may find that the make-and-break connection was not properly adjusted. Again he may discover that certain windows when raised will not give the alarm, and this causes him to shift his attack to this problem. He may trace out short circuits, he may find batteries poorly connected, or the battery solution not properly prepared. A certain button when pressed may cause a bell to ring continuously, and many other details may arise which will cause the boy to question himself, to examine his method, to abstract free ideas, to test

[1] Dewey, John, "Democracy and Education," p. 173.

his application of principles, and to make readjustments to suit these given conditions.

Each new problem or experience in the project leads the boy to shift his methods to meet and solve the difficulties. The projects, to be most educative, will develop situations bound to demand more thinking. To be thoroughly educative, the project must lead the individual to full activity, characteristic of a true project.

The project gives the ideal organization of subject matter to arouse an aim and to direct thinking. The thinking of most worth to the individual is that which is directed by his own aims and not an aim held by someone else or one forced upon him. If the pupil has a specific aim he appreciates the difficulty he has to solve, and there is little doubt that he will be able to select his material intelligently to aid in the solution. Unless his thinking accomplishes results, it is doubtful whether it is of much value.

Teachers frequently have the notion that, if students are assigned difficult problems which they attempt to solve but fail, they are being given valuable training. There are, of course, few accurately derived data from which to gain light on this contention, but the alleged value is doubtful, particularly if we count the discouragement of the pupil which naturally follows an unaccomplished task. The sensitiveness of the pupil must be guarded, and teachers must not allow him to lose his self-confidence.

Organization of the schools and the curricula should provide opportunity for developing life situations, which will involve effectual thought. It may be a long time before our schools are so organized as to take care of the projects which typify life situations, but there is no excuse for not applying projects as far as possible without completely disorganizing our present system. Information, whether gained in school or outside of school, will be vitalized by close association with its use or function. The project offers a convenient unit to carry forward information simultaneously with its function. As Dewey says:

"Every recitation in every subject gives an opportunity for establishing cross connections between the subject matter of the lesson and the wider and more direct experiences of everyday life.

"Processes of instruction are unified in the degree in which they center in the production of good habits of thinking. While we may speak, without error, of the method of thought, the important thing is that thinking is the method of an educative experience. The essentials of method are therefore identical with the essentials of reflection. They are first that the pupil have a genuine situation of experience — that there be a continuous activity in which he is interested for its own sake; secondly, that a genuine problem develop within this situation as a stimulus to thought; third, that he possess the information and make the observations needed to deal with it; fourth, that suggested solutions occur to him which he shall be responsible for developing in an orderly way; fifth, that he

have opportunity and occasion to test his ideas by application, to make their meaning clear and to discover for himself their validity."[1]

The project as defined makes provision for the necessary requisites for thinking as outlined by Dewey.

The following project is outlined to show how the project takes into account these items:

The boy accepts the project of determining the value of each cow in his father's herd of fifteen, with the additional idea of improving the production by proper rations. Possibly the father has agreed to credit him with half of his savings, with the understanding that this money is to aid in the boy's college education. This type of project may be exaggerated. Possibly few projects can or will be tied up with so many points of interest, yet this one is not at all impossible, in fact, it has actually been used. It has the merit of giving the pupil a genuine situation. There is continuous activity in carrying the project forward when the pupil is interested. Second, there will be many genuine problems developing within this project, which will be a stimulus to thought. The boy will keep a daily record of the rations, the record of the products of each cow, and possibly will develop the determination to get rid of the non-paying cows and to invest in new and better stock. Situations arise daily which demand that the boy take an inventory of the conditions and make a hypothesis. Third, he must possess informa-

[1] Dewey, John, "Democracy and Education," pp. 191–192.

tion and take observations in order to make a success of his project. If he doubts his recommendations, he will go to the sources of information to help him solve the difficulties. It may be that a few days' change of rations may seem rather expensive and not worth while, even though the production shows a slight gain. The authorities he consults will probably point out that a radical or material improvement cannot be expected immediately. Fourth, suggested solutions of the method of improvement will come to him daily. He will be compelled to develop these hypotheses in an orderly way in order to check results. Fifth, this project affords ample opportunity and occasion to apply his ideas. He will have occasion to test expert opinion on rations, on breeds of stock, and he will be able to discover for himself the validity of these recommendations.

In order to carry his project to completion with distinct success, it is not only possible, but necessary, that attention be given to the items which Dewey points out as essential to real thinking.

The project directs thinking; it develops the attitudes of scientific research that should be fostered in our secondary schools. Boys and girls in the secondary schools have plenty of projects and are eager to receive the teacher's help in solving them. Indeed projects furnish the natural means for developing a scientific attitude. The pupil secures larger benefit if he originates the project, but by no means should we classify

projects as worthless if the teacher suggests them. The value then depends on whether the pupil accepts them as his own, and this is where skill in teaching will be of considerable service.

The steps in the logical method of arriving at a solution of a problem are: (1) defining the problem; (2) collection of data; (3) hypothesis; (4) verification.

The project when carried to completion uses the identical steps of logical thinking. If the foregoing items were given as constituting the method the project employs in arriving at solutions, the statement would be wholly correct. The project furnishes the opportunity for placing pupils in situations in which it is absolutely necessary that they think in order to solve the difficulty.

This point is well emphasized by J. C. Moore in the following paragraphs:

"Pasteur, working on his asymmetric crystals of tartaric acid, came near being caught in the obscurity of university research, but Dumas called him to a real project, the elimination of the silkworm disease that was causing a loss of 20,000,000 kilograms of cocoons to France each year. He was not a technically trained biologist, but having felt the need, the problem became vital. He threw all his energies into the work, to the study he brought the resources from many fields, experimenting, testing, proving, until the result was obtained.

"Then followed that wonderful list of projects, growing out of the needs of his day. The story of every

great invention is the story of a project, and in it we find the following elements:

"A felt need, real, vital, growing out of the unanswered past of one's environment.

"A growing interest and enthusiasm calling for one's best energies and resulting in activity.

"A broad, comprehensive search for related material.

"An organization of the results of personal activity for solving the given project. This summary does not differ greatly from Dewey's analysis of the completed act of thought." [1]

The relation of the project to thinking is indicated clearly by Charters.

"An advantage claimed is that the natural setting and the great multi-problem with its coherent subordinate problems make the intellect function in a fuller tide of activity. The strong initial motive and the constant side lights from practical conditions and immediate practical outcomes makes the student think with a higher degree of effectiveness." [2]

The project must grip the pupil in order to be educative. The organization of the child's thinking will be better if he centers it in a unified theme or problem, so well embodied in the project. The pupil's own projects, and not the teacher's, quicken and coördinate his thinking.

[1] Moore, J. C., "Project Science," *School Science and Mathematics*, Vol. 16, p. 688, 1916.

[2] Charters, W. W., "The Project in Home Economics Teaching," *Journal of Home Economics*, Vol. 16, pp. 117, 118, 1918.

III. The Project and Habit-Formation

It is a recognized fact that drill work is a significant function in education; and it is equally true that at times we may have overemphasized the value of such drill. There is little doubt that a large amount of drill has been formal and unrelated to the student's problem. Dewey well says:

"Not less serious is exaggerated emphasis upon drill exercises designed to produce skill in action, independent of any engagement of thought-exercises having no purpose but the production of automatic skill."[1]

The corrective measure to apply to situations of this type is certainly not to propose a scheme which will consciously neglect drill work and habit-formation, or seemingly make no provision to take care of drills and habit-formation. Habits and skills are far too important in education to permit the assumption that they will be acquired incidentally in the project method. A methodology which makes no provision for habits and skills, other than in a purely incidental way, is seriously defective and may subject its proponents to the serious criticism that they are encouraging "soft pedagogy." The importance which should be given to provisions for habit-formation is clearly indicated by Bagley:

"The work of habit-building must always be accorded the most important place in elementary edu-

[1] Dewey, John, "Democracy and Education," p. 209.

cation. That habits formed in the school may not function in the situations of later life is clearly apparent. That training may not 'spread' beyond limits of the specific function trained suggests the advisability of limiting the strenuous processes of habit-building (1) to those automatic responses that will be of unquestioned service and (2) to those responses that may serve as concrete bases for the later development of concepts and ideals of conduct. . . . The fault of American schools today lies not in the mechanical grind that they are popularly supposed to represent, but in the inadequacy of the really small measure of drill work that is attempted."[1]

The need of drill and habit-formation which supplements the home project in teaching agriculture is recognized by Stimson. In the forenoon and afternoon groups the first period in each session is given to a general study of the productive side of agriculture and rural life. Before the close of each session a period is set aside to subject individual ideas and plans to the criticism of the entire class, to clarify principles, and to intensify impressions through drill. The time is used to give a single focus of attention through collective action. This is a step in the right direction. These periods for the single focus of attention should be frequent enough to guarantee that skills and habits will be formed; otherwise the pupils will be interested in the projects and will fail to get the habits and skills they are entitled to receive.

[1] Bagley, W. C., "Educational Values," pp. 137–138, 1911.

The acquiring of habits and skills may, however, be stimulated by the project method. In carrying forward a given project, the pupils may discover that they are lacking in certain habits and skills and that their progress is impeded because of this deficiency. This realization of the lack creates the natural setting for a project in the acquisition of the needed skills and habits. For example, in one project in physics, it was discovered by the class that they were deficient in algebraic equations. It was a third-year class and they had had no algebra since their first year in high school. Lacking the ability to factor and to solve simple algebraic equations, the class made the request that this drill be furnished. The writer took five hours extra time to complete this project. Another class found in a second grade that its game of bean-bag was being retarded because of lack of accuracy and speed in the addition of simple numbers. A project immediately developed out of this situation, having for its aim the development of speed and accuracy in the addition of simple number combinations.

Both these projects in drill illustrate how projects may arise that are primarily concerned with skills and habits. These represent problems which arose in their natural setting and were carried over into action by developing the habits and skills.

It seems indisputable that the drills and exercises in habit-formation will be undertaken with more zeal if first introduced through a project than if merely set

up as tasks to be done quite apart from any problem; the pupil sees the reason for the drill.

The weakness of the project in making provision for drills and exercises in habit-formation is a real one. The difficulty lies in providing for a sufficient number of projects which have as one of their outcomes the habit or skill which should be developed. On the other hand, it is often difficult to bring to the learner the need for the habit or skill. To the extent, however, that the learner feels or realizes the need for the habits and skills, to that extent he will put forth more vigorous activity and effort to accomplish the task. The attempt to minimize the importance of skills and habits does not answer the problem. To be accepted widely, the project method must make provision in the selection of projects to be pursued for the development of skills and habits. It must be supplemented by a systematic review of the facts learned in the project setting.

IV. The Project and Action

The technique of carrying an act to completion needs to be taught as well as the theory, for the process of carrying out a problem to completion is as difficult as the learning of the theory.

This value of the project in developing the technique of action is well summarized by Charters:

"The acquisition of skill in carrying out processes in actual practice is an advantage claimed. After the

student has learned fruit canning or bread making or hat designing in school as a project she is able to can fruit, make bread, and design hats at home. She does not know mere theory; she has learned the method of performance. The advocates of the project method assert that after the theory is learned there is a wide zone of danger in carrying out the solution, a zone full of difficulties which may ruin the effectiveness of the performance. They point to the fact that some students of home economics whose mastery of the theories is conceded by the most critical, are very inefficient home makers. These advocates explain this by saying that the performance of the act itself involves a very important technique which needs as careful attention as does the solution of the theoretical problems or multi-problems. Nor can it be any more safely left to chance, they say, in the expectation that the student will pick it up for herself at some future time than can the learning of the theory. It is essential to a successful hold upon the subject." [1]

The theory underlying the preparation and serving of a breakfast may have been learned thoroughly by the girl in household science. She knows the method of making coffee, preparing fruit, cereals, toast, and eggs. She has learned the proper method of setting the table, and the rules for serving. In the laboratory she has carried out each of these small exercises with success and could recite thoroughly upon the principles underlying each.

[1] Charters, W. W., "The Project in Home Economics," *Journal of Home Economics*, Vol. 10, p. 118, March, 1918.

When she accepts the project of preparing the breakfast, setting the table, and serving, there is a technique involved in trying to carry out all these activities at the same time. Her problem would be to use her time economically and yet not have the eggs, toast, or coffee prepared before the cereals or the fruit. Taking for granted that she would eat breakfast with the family, her method of procedure would be as follows: First, she places the teakettle on the stove and while the water is heating she assembles the materials for the breakfast and places the breakfast dishes on a tray. The water being heated by this time she prepares the breakfast food, which usually requires stirring for four or five minutes with rapid heat, and then she places the cereal in the top of a water bath. She then prepares the coffee. Next she puts the bread in an oven or in a toaster, drops eggs in boiling water for poaching, and assuming that three to five minutes will be sufficient to cook the coffee, eggs, and toast, that time will be used in setting the table.

This is a real problem that confronts many girls who have completed a course in household science. Some of them state that the most difficult thing they had to learn was to be able to have three or four foods cooking at the same time, so started that each will be done at the proper time. Much of our teaching has usually left this carrying-out process to the pupils; but this cannot be any more safely relegated to chance than can the learning of the theory.

A statement by Mann commenting on the value of carrying the problem over into action is significant:

"Among the professional engineers there is a very marked demand for what they call 'general engineering science.' It is pointed out that a man who graduates from a civil engineering course frequently makes his success in life in mechanical engineering or *vice versa*. It is also pointed out that all engineering problems are essentially projects and that many of them involve a wide knowledge of the different fields of science. To be a successful engineer thus involves having the ability to tackle and solve projects efficiently and this ability is acquired like every other ability, by practice and training in doing. It, therefore, follows that the most efficient training of engineers is likely to be secured in those schools in which the project method of instruction is used most freely." [1]

It is clear from this statement of Mann's that there is a special technique involved in carrying the act to completion. Many engineers know the theory, but fail in making the applications. The project offers a means of providing the training in action.

The project method takes care of the technique of carrying out a complete act. If the boy has been taught agriculture by the project method he knows how to do things. He does not know merely the theoretical phases of growing potatoes; he has learned the method of performance. The project provides for

[1] Mann, C. R., "Project Teaching." *General Science Quarterly*, Vol. 1, p. 14, 1916.

the technique of the completion of the act after the theoretical problem has been solved.

V. Summary

The project creates interest of a deep-seated sort because the interest comes from associative connections of many types. The project offers countless reservoirs from which interest may be drawn. All projects are not interesting, but if a project is selected so as to be of interest, the degree of the interest is likely to be very high, because of its setting in the experience of the student. Of course, it can be shown that the possibilities of interest are much greater than in the facts acquired in topical organization. The project gives the ideal organization of subject matter for arousing an aim and the directing of thinking. It is a plausible assumption that the thinking most worth while to the individual is that which is directed by his own aim and not by some one else, or by an aim forced upon him. If the pupil has a specific goal which he understands and if he knows the difficulty which he has to solve, there is little doubt that he will be able to select intelligently the material needed for the solution. The strong initial motive of the project, with the constant side lights from practical conditions, challenges the student to think with a higher degree of effectiveness.

The importance of habit-formation is too important to take it for granted that in using the project method

habits will be formed incidentally. A methodology which makes no provision for these other than in a purely incidental way is seriously defective and makes its theory subject to serious criticism. The weakness of the project in making provision for drills and exercises in habit-formation is genuine. The attempt to minimize the importance of skills and habits does not answer the problem. The project method, to be accepted widely, must make provision for skills and habits. It must be supplemented by a systematic presentation, organization, review, and repetition.

The project method takes care of the technique of carrying out a complete act. If the boy has been taught agriculture by the project method, he knows how to do things. He has learned the method of performance. The project provides for the technique of the completion of the act after the theoretical problem has been solved. "The acquisition of skill in carrying out processes in actual practice" is an advantage claimed for the project.

The relation of the project to the curriculum will be taken up in Chapter VI.

CHAPTER VI

THE PROJECT AND THE CURRICULUM

I. The Need for Scientific Methods in Curriculum Organization

This is the era of efficiency in educational procedure, for on all sides there is evidence of quantitative and qualitative methods being applied to the problems of education. Guess work and hazy impressions are being replaced by information wrought out by scientific investigations. The results of teaching are to a large extent now being measured by standardized tests. This scientific procedure has found its way into all phases of school administration and supervision.

Scientific methods applied to curriculum making have just made a beginning. This backwardness is due pretty largely to the fact that the objectives of teaching have not been analyzed. Such objectives as "complete living," "adaptation of the individual to his environment," "social efficiency," are, without further analysis, too general to be of any particular help in suggesting materials which make up the curriculum. Since it has been very difficult to propose a definite scheme whereby these vague objectives might

be realized, the tendency then has been to fall back on the subject matter, without modification, that had been in use.

II. Principles and Illustrations of Curriculum Making

The general principles of curriculum making are fairly simple. No matter what type of occupation the individual goes into, it will consist in carrying out certain activities, in other words, projects. If the school through a scientifically organized curriculum is to prepare these individuals for rendering efficient service, it must give help to the individual in carrying on these activities. It follows that in order to give this help, those responsible for making the curriculum must know what facts, processes, principles, habits, skills, and ideals are necessary for the various activities for which the curriculum prepares. Since the occupations are so numerous, these smaller objectives, which the curriculum maker must consider, will be far from few.

There are at least four bases for the construction of a curriculum — facts, principles, processes, and projects. The first three of these are usually included in the type of organization which is known as the logical or systematic arrangement of material. Generally speaking, then, the principal methods of curriculum making are the logical and project methods.

The logical organization represents a perfected sys-

tem, its materials are arranged in subdivisions, topics, paragraphs, according to the demands made of the material from a logical standpoint. Logical organization demands that the material be put together so that there are no omissions and so that each topic can be given its relative place in some sort of scheme previously determined.

If the project is made the basis for curriculum making, it is necessary to decide what principles should be mastered by the students and then select projects or groups of projects from which the student may select. The projects selected will be such that all the facts, principles, and processes will be covered which ordinarily are covered in the logical or systematic presentation. The facts, principles, and processes are now studied as the need arises in carrying the projects to completion and the student realizes their functional value.

(a) *A Curriculum in Woodworking Based on Projects*

The difference between the construction of the curriculum based on principles or processes and on projects has been worked out by L. R. Fuller, Regional Director of Industrial Education. The systematic or logical organization of a course in woodworking is indicated and the effect of the use of the project on this organization is shown by him.[1]

According to systematic organization in woodwork

[1] Unpublished paper.

the following thirty-two processes are involved. The method of dealing with these from the logical or systematic point of view would be to give examples, illustrations, and drill on each process until fairly well mastered and then pass on to the next process.

1. Planing
2. Scoring
3. Sawing
4. Boring
5. Sandpapering
6. Scraping
7. Bowsawing
8. Gauging
9. Nailing
10. Screwing
11. Gluing
12. Countersinking
13. Spokeshaving
14. Chiseling
15. Gouging
16. Finishing
17. Laying out
18. Chamfering
19. Beveling
20. Modeling
21. Carving
22. Mortising
23. Mitering
24. Fitting
25. Superposing
26. Doweling
27. Inlaying
28. Assembling
29. Dadoing
30. Grinding
31. Whetting
32. Filing

The project method of teaching these thirty-two processes would be to select projects the carrying of which to completion would involve the processes indicated above. Projects were analyzed by Fuller to find out just what processes would be used. He selected projects that involve the type of repairs and work needed in the homes. In eight projects, — building walks, door, screen, floor, and furniture repairs, conveniences for the home, handles in tools, and sharpening tools, — he found that all but two of the above thirty-two processes were represented, while some processes as planing, scoring, and sawing were involved in six of the projects. This group of eight

projects could be selected, then, as the basis for giving training in at least thirty processes.

Processes	Times Used in Series	Projects	Processes Involved
1. Planing	8	Cutting Board	1
2. Scoring	7	Hat Rack	1, 2, 3, 4, 5, 18
3. Sawing	7		
4. Boring	6	Laundry Register	1, 2, 3, 4, 5, 8, 18
5. Sandpapering	7		
6. Scraping	3	Coat Hanger	1, 2, 3, 4, 5, 7, 13, 14, 17, 20
7. Bowsawing	4	Knife and Fork	1, 2, 3, 4, 5, 8, 9, 17, 24, 28
8. Gauging	2	Box	
9. Fastening nails	2	Teapot Block	1, 2, 3, 5, 6, 14, 16, 17, 18, 27
10. Screwing	2		
11. Gluing	3	Flower Pot Stand	1, 2, 3, 4, 5, 6, 8, 10, 11, 16, 17, 24, 25, 26, 28, 29
12. Counter-sinking	1		
13. Spokeshaving	3		
14. Chiseling	2	Table	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 22, 24, 25, 26, 28, 29
15. Gouging	1		
16. Finishing	5		
Filling		Tray	15, 16, 17, 21
Staining			
Shellacking			5, 6, 13, 17, 20, 24
Varnishing			
Waxing			11, 16, 17, 19, 23
Painting			
17. Laying Out	8	Hammer Handle	
18. Chamfering	3		30, 31, 32
19. Beveling	1	Picture Frame	
20. Modeling	2		
21. Carving	1		
22. Mortising	1		
23. Mitering	1		
24. Fitting	4		
25. Superposing	2		
26. Doweling	2		
27. Inlaying	1		
28. Assembling	3		
29. Dadoing	2		
30. Grinding	1	Sharpening	
31. Whetting	1	Knives, Forks,	
32. Filing	1	Tools	

The foregoing table shows a group of selected projects, giving the number of times each of the processes has been used in the series of projects. After each project, the different processes involved are indicated. The numbers to the right of the processes indicate the number of times they are employed in the projects listed. Each is counted only once to a project.

It will be noted that in the topical method one would teach these thirty-two processes by exercises in those particular processes. Teaching these processes by the project method, they are learned in connection with life situations. The functional value of skills is realized. These are problematic acts carried to completion in their natural setting.

If we take one of the projects, the building of walks, we find that processes 1, 2, 3, 9, 24 of the systematic outline are used, and the project of making a table involves twenty-two processes. It will be noticed that some of the processes are used many times in the completion of the group of projects. Since planing and sawing require more practice and are more frequently used than some of the other processes, it is fair to state that these projects were selected with the purpose of giving drill where most necessary.

(b) *Illustrations of Curricula Based on Projects*

An interesting reorganization of curricula is being worked out by Professor H. M. Goettsch at the University of Cincinnati. After sixteen weeks' prelimi-

nary training in elementary chemistry, the freshmen are given problems in industrial chemistry on which they work for ten weeks from 8 A.M. to 4:30 P.M. Thus the principles of industrial chemistry are developed as needed in carrying the projects to completion.

"Projects such as to 'make baking powder and determine whether it is better and cheaper than you can buy' are assigned without any instructions or references, and the student is required to work out his own salvation in the library and the laboratory. In the period of ten weeks he completes a number of these projects covering a wide range of topics, but little effort is made to present the topics in logical or any other sort of orderly sequence. Much emphasis is placed on synthetic work and on the cost of a given product by different processes; while chemical analysis and the ionic theories of matter, which usually occupy the center of the stage in chemistry courses, here take a subordinate place."[1]

The Sub-Committee on General Science of the National Commission on the Reorganization of Secondary Education is giving serious consideration to abandoning the strict organization of sciences according to their content in the first and second years of the high school. As a substitute, it is proposed to teach the facts, laws, principles, and processes from all the sciences in connection with a series of projects.

[1] Mann, C. R., "A Study of Engineering Education." Bulletin of the Carnegie Foundation for the Advancement of Teaching, pp. 61–62, 1918.

"According to the plan proposed the project would be the basis of organization for the scientific facts and principles that were needed in carrying it out. For example, if the project were the raising and marketing of an acre of potatoes, the students would study the physics and chemistry of the soils and fertilizers, the topography and drainage of the ground, the rainfall and weather conditions, the structure and physiology of the potato plant, the development of varieties by breeding, the physical and chemical effects of tillage, the insect enemies and the appropriate insecticides, the bird enemies of the injurious insects, the cooking and the food value of the potato, the nature and uses of potato starch, the marketing of the potatoes and so on."[1]

The student in carrying to completion any of the projects noted would see and realize the need for accurately determined facts. Because he wished to learn he would investigate, collect data, and form judgments. Facts would be learned from the many sciences, not in the logical order, but in the order needed in completing the project.

The following project will illustrate the method by which C. W. Stone organized a project so that it would cut across many subjects in the curriculum. This project will illustrate what Dewey calls "facts not torn away from their original place and experience."

[1] Twiss, G. R., "Science Teaching," p. 197. The Macmillan Company, 1917.

Plan for Life Topic for Grade I

Center of Interest: Seasons, Spring

Topic: Making a Flower Garden at Home

The following outline shows the work on this topic. The subjects in which it works out are industrial arts, arithmetic, and music.

I. Learner's Available Experience

1. All the children have seen gardening done at home.
2. Many of them have had little plots of their own in the big garden at home.
3. They have had considerable experience in the school garden in preparing soil and the several groups have planted radishes, lettuce, cosmos, petunias, and candytuft. One group planted nasturtium seed between the ivy plants around the building.

II. Teacher's Main Aims

1. To teach to measure with foot rule.
2. To add to their interest in gardening by application at home of knowledge gained at school.
3. To get good expression, both in language and in reading.
4. To increase enjoyment through a story and a song which express their own fresh experiences.

III. Stages of Teaching

1. Enabling pupils to feel their need of learning.

Conversation in which the children are encouraged to tell of their little gardens at home, and of their

work in the school garden. Proposal to give them seed to plant gardens of nasturtiums at home. How shall the garden be made in order to have beautiful nasturtiums? (Pupils' aim: To make gardens of their own and raise beautiful nasturtiums.)

2. Enabling pupils to acquire knowledge to satisfy their felt needs.

Industrial work.

Conversation on how to plant their seed, turning on the importance of not crowding plants. Making of rules for measuring home gardens. (Good seat work.)

Arithmetic.

How far apart shall we plant the seeds? Approximate space decided on. Lessons with foot rulers teaching how to measure the exact distance between seeds.

Literature.

Story of Marjorie's garden to increase interest and add to knowledge by learning how Marjorie managed her garden.

Music.

The motion song: "In My Little Garden Bed."

3. (*a*) Testing results.

For Industrial Work and Arithmetic: Have the children measure an imaginary garden on the floor, placing small articles as bits of chalk for seed.

For English: Thinking for themselves and deciding whether they can read the stories.

For Literature: Retelling the story in class to see whether they are ready to tell it for the enjoyment of the others.

For Music: Singing in class to see whether they know the song well enough to sing for the enjoyment of the other section, at home, etc.

(*b*) Applying Results.

For Industrial Work and Arithmetic: Making the garden at home.

For English: Reading the 'stories' to each other.

For Literature: Telling the story to the other section, at home, etc.

For Music: Singing for the other section, at home, etc.[1]

(c) *Two Plans for the Organization of Subject Matter in the Curriculum*

Another example taken from the field of industrial education shows how the project cuts across many of the subjects of the curriculum, in other words, how it destroys the logical order of organization. This method is described by C. R. Allen.[2]

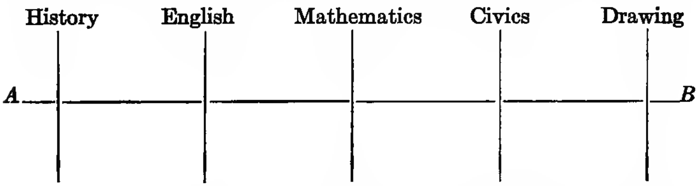
As suggested by Allen there are two plans for the organization of subject matter in the curriculum. The one is the method by independent subjects and the other the scheme of major and minor subjects. These two plans have been recognized.

The former method has selected the desirable subjects to be taught in the curriculum and has made plans for their development independently. The various subjects in the high school curriculum have been treated as separate units, with little provision made for connecting the different subjects. History is

[1] Stone, C. W. Outline sent to the writer.

[2] Allen, C. R., "The Project Method and the Combination of the Project Method with the Phase System." Massachusetts Board of Education, Bulletin 75, pp. 40–47.

taught chronologically, but is not connected with civics. Mathematics is taken up according to the logical arrangement of the textbook and often does not relate to drawing, to physics, or to chemistry. Allen illustrates this scheme by the following diagram:

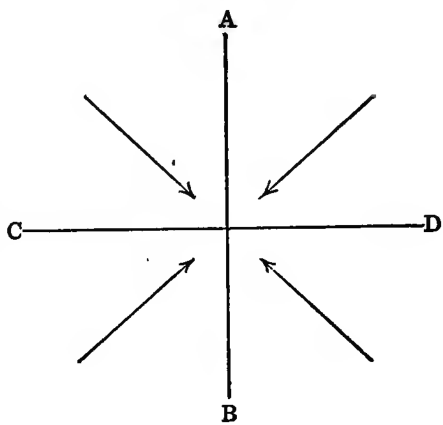


The line *AB* may represent the particular items of knowledge learned by the pupils on a given day by the independent organization. It is quite improbable that the knowledge learned in mathematics will have any relation to the drawing, to the English, or to history. "It is very improbable, for example, that if his history lesson deals with the method of administering justice in England in the Middle Ages that his civics lesson at the same time will deal with the modern method of court procedure which is derived from the old English procedure; that if his civics lesson deals with a question of community planning, his drawing lesson will in any way involve, for example, the laying out of a park plan on paper."

It would be advantageous if the independent courses could be so arranged that the different lessons learned on the same day could center around the same problem or idea. Under the independent scheme of organiza-

tion, the boy in the shop finds it practically impossible to secure technical information in the different subjects at the time he needs it. In the drawing job he needs the assistance of certain formulæ for the particular job, in the history of the trade, how the operation was performed a hundred years ago. Under the arrangement by independent subjects he may get some of this information next week or perhaps he had some of it so long ago that he has forgotten it.

If the subject matter of the different subjects could be taken up at the time when it was needed in connection with some particular job, the students would realize its functional value. The correlation in such a case would be excellent.



In contrast with the method of independent subjects, the "major and minor subject" scheme is based upon the idea of selecting some one subject considered to be of primary importance, subordinating the other subjects to that 'major subject.' In the illustration, the requirements of the shop work will determine the order of all other lines of instruction.

"In such an organization when the boy has the turning of a taper in the machine shop, he gets at that time, in his materials of trade, the study of the problem of the selection of proper stock; in his mathematics, the figuring of the offset; and in his history of trade, the information as to how they got a taper before they had a lathe. Under this method the only line of work which would show logical progression would be the shop work. If we were to take the materials of trade, the mathematics or the history, and should arrange those topics as they might come to the boy, they would offer an entirely disconnected series, the only progressive subject being his shop experience. This scheme is indicated in the diagram, where the line *AB* would indicate the progress of the boy in the shop work, the line *CD* would indicate the point where he had reached the problem of turning a taper, and the various arrows pointing to that particular point would indicate the parts of such subjects as materials of trade, mathematics, etc., which bear upon that particular problem.

"Since the above method of instruction is based upon the idea of selecting the most important subject and subordinating all other subjects to that, it obviously affords opportunity for a much closer correlation than the first scheme. It is much more likely to meet the condition in the earlier stages of the average pupil's progress, where the dominant subject is unquestionably shop experience. In suggesting this method for use in the vocational schools, there has simply been recommended the plan which has been always recognized as the more efficient of the two." [1]

[1] Allen, C. R., "The Project Method and the Combination of the Project Method with the Phase System." Massachusetts Board of Education, Bulletin 75, pp. 40–45.

The main reason which the writer gives for this method is that in an industrial school it teaches the student to know how to perform the processes necessary to carry on his trade and insures that he will be paid for what he can do. If the primary aim were to impart information, the method of independent subjects might be used effectively.

The writer indicates which of these two methods is named the project. "To experiences in a major subject, around which are grouped the fragments of minor related subjects that apply, we have given the name 'project,' and the method of instruction based upon a series of such projects we have called the 'project method.'"

The educational use of the project, according to this writer, "implies that in connection with the discharge of a responsibility, problems must be solved, the solution of which involves an educational experience, and that there is a problem in some major subject of instruction, the solution of which requires the student to acquire and apply fragments of minor subjects. According to the aim of the course of instruction, the portion of the major subject, or 'core' of the project, may lie in any field of instruction. For example, the major subject might lie in the field of English composition. In writing a composition the pupil must write, spell, apply grammatical rules, use figures of speech, and in general, apply to that particular problem (writing the composition) fragments drawn from the fields covered by the subjects commonly taught under the names of 'spelling' 'penmanship' 'English gram-

mar,' and 'rhetoric.' In a similar way, projects might be organized around a 'core' taken from the field of history or mathematics or civics." [1]

III. Projects Need Not Cut Across Subjects of the Curriculum

These examples might seem to convey the idea that for complete success with the project method, it would be necessary to have it cut across two or more subjects of the curriculum. This is not a necessary inference, nor is this cutting across many subjects of the curriculum a necessary element in the efficiency of the project method. It is true that the projects may be so selected as to include two or more subjects of the curriculum, but it is likewise true that the work can be made just as effective if the project is kept within the limit of a given subject. The installation of a bell system in the home falls within the field of physics. Testing the baking powder for the home falls within the field of chemistry. The preparation of the meals at home or canning fruit falls within the field of home economics.

IV. Obsolete Material in School Curricula

The criticism of schools and school curricula for their failure to give instruction which is practical, instruction along project lines, is due in large measure to the

[1] Allen, C. R., "The Project Method and the Combination of the Project Method with the Phase System." Massachusetts Board of Education, Bulletin 75, pp. 44–45.

fact that we rarely eliminate from our textbooks but are constantly adding. It takes a long time to eliminate from the textbooks and courses of study operations and materials which have become obsolete. This situation is due in part to the lack of an opportunity to use the material of the curriculum in solving difficulties arising in their natural setting, in the pupil's home and school life. The project method eliminates obsolete material for it uses only such subject matter as is necessary for the solution of the project.[1]

V. The Project as the Basis for Curriculum Organization

If the projects which the farmer is called upon to carry out in his work were carefully classified and the data selected from a large number representing different localities, this series of projects, with the principles which they define and illustrate, would be a most effective basis for use in the organization of the curriculum in agriculture. It would be possible, although difficult, to collect a large number of life-projects in the various occupations, industries, and professions.

[1] "This shortcoming may be laid at the door of that false conception of the object of education as mere knowledge. Such a conception defeats its own end, as knowledge is defined as past experience organized to meet the demands and problems of new experience. Instruction is not complete until application of facts learned has been made and their usefulness demonstrated by the solution of problems of a practical character which develop out of the study itself and which possess a powerful appeal to the pupil." — Yearbook of Francis W. Parker School, Vol. 4, p. 5.

If these projects were national in their scope, the materials used in carrying them to completion would form a partial basis for the curriculum. There is serious difficulty in trying to organize a curriculum based entirely upon the material from this source. Great care would have to be taken in the completeness of the selection of the projects; the principles underlying them would have to be defined; and, again, a course of study based entirely on this idea might be subject to the criticism that we are training the students to meet situations which, in all probability, will no longer exist when they are ready to use this material.

This method of building up the curriculum in agriculture is clearly presented by Bobbitt.

"The curriculum-discoverer wishes, for example, to draw up a course of training in agriculture. He will go out into the practical world of agriculture as the only place that can reveal the objectives of agricultural education. He will start out without prejudgment as to the specific objectives. All that he needs for the work is pencil, notebook, and a discerning intelligence. He will observe the work of the farmers; he will talk with them about all aspects of their work; and he will read reliable accounts which give insight into their activities. From these sources he will discover the particular things that the farmers do in carrying on each piece of work; the specific knowledge which the farmers employ in planning and performing each specific task; the kinds of judgment at which they must arrive; the types of problems they must solve; the habits and skills demanded by the state; the

attitudes of mind, appreciations, valuations, ambitions, and desires, which motivate and exercise general control." [1]

If this method of curriculum organization be used, — that is, a compilation of the life projects in that field, — it will be well to supplement it with a systematic organization. The systematic or logical point of view will give the learner more cues to aid him in solving a new problem. Principles will not be tied up in a few concrete examples.[2]

Though there are many practical difficulties seen in attempting to use this method as the basis for curriculum organization and construction, and while few of even the most enthusiastic advocates would recom-

[1] Bobbitt, F., "The Curriculum," pp. 48, 49.

[2] The necessity of giving a systematic view or a complete conception of the subject, when using the project method in chemistry, is emphasized by Mann. "For a series of interesting projects that does not eventually compel the student to work out a fairly complete conception of the large theories and the important principles of chemistry is obviously inadequate, no matter how enthusiastic the students are at work. On the other hand, although the suggestion that an effective course can be constructed as a series of apparently disconnected projects comes as a shock to those who have grown up with logically rigorous courses, the value of the enthusiasm engendered by well-chosen projects must not be overlooked. Our most valuable information and training come from working out projects that are really worth while; and if this method works in life, why not in school? Especially since in educational institutions it is always possible to organize significant projects into a connected series that leaves a well-developed conception of the whole subject in the student's mind." — Mann, C. R., "A Study of Engineering Education." The Carnegie Foundation for the Advancement of Teaching, p. 62, 1918.

mend that it be used as the only method in determining minimal essentials of subject matter, yet there is no excuse for not collecting these data as widely as possible and using them for what they are worth. No one can doubt that it will be valuable for the project to become "the center of logical organization for the information gained, just as it does in the case of the problems worked out by the farmer, the mechanic, the municipal engineer, the industrial manager, or the intelligent home keeper, who brings results to pass in the world of adult activity. Time may be and should be taken, at intervals, to organize the information gained in working out the projects, in accordance with the reference book or a compendium type of arrangement; and this work of organization may constitute a series of projects in themselves which will arouse much interest, if skillfully handled." [1]

VI. Summary

The method of organizing the curriculum on the basis of the project method is well summarized by Charters.

"If the project is to be made the basis of the curriculum, it is necessary for the teacher to decide as scientifically as possible what principles and processes should be mastered by the student and then to select not single projects but groups of projects so arranged

[1] Twiss, G. R., "Science Teaching," p. 423. The Macmillan Company, 1917.

that election of projects is made possible with the certainty that all essential facts, processes, and principles will be covered. Then, when the principles and processes have been covered by the project method in class, enough time should be left in the course so that the subject matter may be systematized. First, the project is used for the approach to all parts of the subject, and then a systematizing study of the field follows as an extended summary." [1]

[1] Charters, W. W., "The Project in Home Economics Teaching," *Journal of Home Economics*, Vol. 10, p. 117, March, 1918.

CHAPTER VII

APPLICATION OF THE PROJECT IDEA

In Chapter III it was stated that while the term project has been but recently added to our educational terminology, the idea behind the term has been used with some modification in many subjects, such as engineering, medicine, law, journalism, salesmanship, and foreign language teaching. The uses which these different subjects have made of the project idea will be discussed in this chapter.

I. Engineering.[1]

An attempt to approximate the project idea has been back of some of the methods in engineering education since the foundation of the first engineering school in America, the Rensselaer Polytechnic Institute founded in 1824. The Rensselaer school was not able at first to own its own shops, but the founder directed —

"that with the consent of the proprietors, a number of well-cultivated farms and workshops in the vicinity of the school be entered on the records of the school as

[1] Mann, C. R., "A Study of Engineering Education." Bulletin of the Carnegie Foundation for the Advancement of Teaching, 1918. (This report gives in detail the methods of teaching Engineering and the use of the project method.)

places of scholastic exercises for the students, where the application of the sciences may be most conveniently taught."

The first curriculum at Rensselaer required for completion one year, divided into three terms. The students began with an "experimental term," gathering specimens and visiting shops and factories near the school, later discussing in class the information obtained. In the last nine weeks of the year the students applied their knowledge to practical projects in the local engineering shops. Mann's description is interesting:

"The students are required in the first three weeks of the first term to examine the operations of artists and manufacturers at the school workshops under the direction of a professor or assistant, who shall explain the scientific principles upon which such operations depend, four hours on each of six days in every week. This plan is identical in principle with that now in use at the Sheffield Scientific School at Yale. There the students spend their whole time for three weeks before the opening of the second year in a well-organized course of this sort called 'mechanical technology.' The boys do no actual manual work in shops. The purpose of the course as stated in the catalogue is, 'to acquaint the student with the terms and processes in use in manufacturing and power plants, and to give him some personal contact with engineering work before taking up his studies in the classroom and the drafting room.'"

Both of these methods illustrate the effort made to raise the problem in its natural setting. The students see the commercial operations in their natural setting and to that extent the procedure approaches the idea of the project. The exercises are not true projects because the students did not carry out any of the processes; they did not acquire any manual skill, nor were principles developed as needed in carrying any of the processes to completion.

Another method of handling the shop problem is illustrated at the Worcester Polytechnic Institute. There on the campus is established a small manufacturing plant where twenty journeymen are regularly employed and articles made for the open market. The students work side by side with the journeymen, but are relieved by them of much of the monotonous repetition. Apparently the students are not kept at a process longer than is necessary to obtain a fair mastery. In addition to this, the students are given thorough training in scientific shop management.

This method illustrates the project method. The only place at which it seems to fall short is in the lack of this small plant's facilities to present real typical manufacturing projects, although the students undoubtedly receive excellent training in the few processes required for the business of this particular shop. A plant of this sort will necessarily be small and will not be so well equipped as are the regular commercial plants; consequently the projects will not be quite

typical. The Worcester plan gives training in the principles and processes of engineering under industrial conditions.[1]

Another interesting approach to the project method is carried out in connection with the shop work in the engineering college at the University of Illinois. The production of a salable article is regarded as an essential part of the shop training. The manufacturing of a two-cylinder gasoline engine was the first project undertaken. Plans of operation by the most efficient methods, within limits, were developed. The whole idea was to present to the students a progressive shop with a corresponding progressive policy.

This phase of the work is commented on by Benedict:

> "The scope of the mechanical organization was the same as in commercial shop practice when similar results were sought, and it may fairly be said that in respect to methods and facilities the shop laboratories are on an equal plane of efficiency with any well organized industrial plant engaged in manufacturing similar products."[2]

While emphasis is placed on the mechanical facilities for production, yet the main training which this ex-

[1] "The manufacturing shop is a working model for the study of the technique of business and of practice. The productive nature of the work and the objective test of its salability are two of its important characteristics that tend to make the experience significant." Mann, C. R., "A Study of Engineering Education," p. 76.

[2] Benedict, B. W., "Shop Instruction at the University of Illinois." Bulletin, Society for the Promotion of Engineering Education, Vol. 6, p. 239, December, 1915.

periment seeks is that of demonstrating the principles underlying modern commercial methods of manufacturing. Each student or group of students has a different rôle to play, so that by the end of the year, all have had experience in every phase of production and manufacturing. The experiment has many of the project elements. There is an effort made to have the work developed in a natural setting, for one of the conditions stated by Benedict is that the shop laboratories must be "true to life"; *i.e.*, correspond in all essentials of methods and equipment to commercial plants of recognized merit. Although this is a very effective laboratory method, it does not illustrate a true project. Principles are not developed by the students as needed, for, in a large measure, the students merely follow directions.

The method used in the University of Illinois and its relation to the project is well summarized by Mann.

"In this Illinois plan construction is still an integral part of instruction; but the omission of the journeyman mechanics shifts the emphasis from actual commercial production, subject to the objective test of salability in the open market, to instruction about methods of commercial production. The shop becomes a 'shop laboratory' and the manipulations there partake of the nature of experiments designed to verify the principles of production that are operative in the industrial world, rather than to solve problems that arise in connection with their productive activities. As in most current laboratory work, the chief problem

for the student is likely to be that of following directions intelligently, rather than that of finding the answers to questions that cannot be answered without making laboratory tests." [1]

The most elaborate attempt to institute the natural setting for engineering problems has been developed by Schneider at the University of Cincinnati. It is known as the "coöperative system" of education. The development of this system was due to the fact that the old apprenticeship system had broken down under the strain of the varied commercial demands and that the colleges of engineering were making little effort to connect theory and practice. The colleges that were attempting to give practice were maintaining their own shops and plants at a tremendous expense. It became apparent that to try to keep up with illustrative shops would be out of the question. To Professor Schneider belongs the credit for planning a course which could use the established manufacturing plants for the practical training, thereby allowing the University of Cincinnati to devote its energies to the theoretical.

The course outlined by Professor Schneider in engineering covers five years of eleven months each. The work is alternated so that the students may spend two weeks out of four in the University and two weeks in the coöperating manufacturing plants. There are two shifts of students, so that while one group is in

[1] Mann, C. R., "A Study of Engineering Education," p. 77.

the University the other is in the plants. The practical work is carried on continuously. The coöperating firms represent every important phase of engineering, and the work is so arranged that the student will be able to get practical training in all phases of his specialty. In railway engineering he will work out problems in connection with a real railroad. The work of the course is outlined so that there is constant correlation between the work done in the plants and that done in the University. The practical projects undertaken determine the subject matter to be taught in the period spent in the classroom.

There seems to be heightened interest in both the practical and theoretical work. The wages earned by the students in the coöperative plants give an added incentive. The scheme has had a wholesome influence on the curriculum as a whole and on the subject matter of the different courses. Descriptive material that has no apparent place is eliminated and the additional time is spent in drilling on fundamentals.

The feature of the coöperative education which is the most important from the school standpoint is the "realization of theory through its practical application." The practical work, carried on in the coöperative factories, creates for the students problems which demand solution. The coöperative course is so graded that no task is undertaken which is beyond the student's ability. The problem of doing a certain task demands that he apply his theory gained in the previous two

weeks' period and apply it to this situation. In addition new problems arise which demand solution during the practice terms, allowing the student opportunity to develop principles as needed.

The coöperative plan offers the advantage of providing a real shop atmosphere where commercial products of a large variety are manufactured and subjected to the test of their salability. By this scheme projects are carried to completion in their natural setting.

Another interesting approach to the project method is the method developed or practiced in some engineering colleges in connection with the practical work of surveying. The practice work usually given in connection with the surveying courses has been (1) the surveying of the campus, (2) the summer-camp work where a certain amount of territory is assigned, and (3) actual practical work. Professor C. E. Sherman gives the account of the beginning of the Summer Surveying Courses at the Ohio State University.

"In response to student sentiment, and in view of the fact that the campus exercises gave no noticeable proficiency in the use of the instruments, nor an adequate idea of procedure in the field, a special course in field practice was tried in June, 1888.

"The class of seven second-year civil engineers in charge of Professor Brown, after studying land and railroad surveying for a year, spent one week in June in making a reconnaissance, preliminary, and location survey for a proposed electric railway two and a half miles long, between two small towns distant about

60 miles from the University in the rough southeastern portion of Ohio. Most of the field work was completed, map drawn up in pencil, and earthwork partly figured before leaving the field."[1]

In 1900 the University authorities provided a camp equipment and this practice training was continued in the camps from 1900 to 1902. These camps gave excellent practice, furnishing an opportunity to show the difficulties met in surveying that would not be brought out on the level campus. The work was rotated, in order to give the students different types of training. Office work was done each night, — plotting notes, inking maps, and calculating earth work.

This work did not constitute a true project, but rather a multi-problem. The work was done to pass a school requirement and to give laboratory work.

The students who were excused from these "laboratory" camps to go on practical work came back to their tasks in the fall with so fine a spirit that after three sessions it was decided to try the practical summer-camp system.

The work of the practical summer camp is done under the supervision of one of the university instructors who acts in the capacity of a foreman. The experience of the class as a whole varies widely in amount and character, but this may be looked upon as an advantage,

[1] Sherman, C. E. and Schlafly, R. K., "Summer Surveying Courses at the Ohio State University." Engineering Education, Vol. 21, pp. 278–319.

for, " in the work before the class in the lecture room, it arouses the members when points are brought forward from their collective experience." The aim of the department has not been to give identical training to each member of the camp, but rather to provide a real task, " the accomplishing of which will forcibly illustrate to the student the use of the instruments and methods of his calling." [1] When the student sees instructors attempting real problems and relying on each to do his share, it encourages a spirit difficult to get in imaginary or practice problems. The students are expected to give suggestions and to question the work at any stage.

The practical summer camp and actual employment with practicing surveyors are both superior to the practice summer camp. The advantages for the practical summer-camp work are:

(1) The student gets more thorough drill on a few principles even though not such a broad training.

(2) The sense of responsibility is increased.

(3) The job creates greater interest and enthusiasm.

The opponents of the practical summer-camp scheme maintain that in the practical camp it is " difficult to adapt the work to meet exactly the educational needs of the students, the incessant and comprehensive drill in fundamental principles."

[1] Sherman, C. E. and Schlafly, R. K., "Summer Surveying Courses at the Ohio State University." Engineering Education, Vol. 21, p. 313.

The practical surveying approximates the project. If, however, the purpose is merely to illustrate principles previously learned then it is not a project because there are no problems involved. On the other hand, if principles are developed in this practical work as needed, then it is the project method. Problematic acts are carried to completion in their natural setting.

II. The Legal and Medical Clinics

Some of the ideas embodied in project teaching have been incorporated in medical education under the interneship and clinics. Recently the need recognized in legal education for a type of training which would give the students practice in carrying through a case in its natural setting has led to a type of teaching known as the legal clinic.

It is now generally conceded that training in legal reasoning and substantive law can be most economically learned in the law school. This point is emphasized by E. M. Morgan:

"It is doubtless true that familiarity with the principles of practice and their application could be most effectively acquired in some offices, if the lawyers in charge thereof were so minded. But only in those offices having a general practice could anything like a comprehensive knowledge of the subject be attained without a great deal of independent investigation. At present, the offices of general practice are few; and in those few offices the time of the experienced men is

considered too valuable to be spent in the instruction of embryo jurists." [1]

The instructors in the law schools are beginning to feel that some provision should be made to give this training in practice in connection with the work of the law school. As Morgan indicates:

"There would seem to be no more reason for failing or refusing to teach the principles of practice than for dropping the usual courses on pleading and evidence. Why should a law school teach the requisites of pleadings, the effect of defects and irregularities therein, and the methods of attacking them, and refuse to give instruction as to the same matters with reference to process? Is it less essential that a student know the effect of an appearance than that he know the effect of pleading over? The principles underlying the right to a jury, the selection of jurors, and the right to open and close, to take or force a dismissal, and to secure a directed verdict; the rules governing instructions to the jury and requests therefor; . . . the privileges and limitations of counsel in arguing to the jury; the prerequisites and grounds of motions for a new trial, judgment notwithstanding the verdict, or an appeal — all these and other matters of practice are fully as important as the rules of evidence. They are almost as adequately treated in the decisions, and are as readily and as satisfactorily taught by the case method. And, in fact, the rules of pleading and evidence are of little practical value unless properly articulated with the rules and principles of practice." [2]

[1] Morgan, E. M., "The Legal Clinic." *American Law School Review*, Vol. 4, p. 255, March, 1917.

[2] Morgan, E. M., *op. cit.*, p. 252.

It is possible to be familiar with the principles and rules of evidences and practice and not be able to recognize their applicability to a given case. This situation is similar to one in which the girl in household science may know the principles of a balanced meal, the principles of interior decoration, and yet may be helpless in applying these to the improvement of home conditions.

The real test of ability in practice is shown in the power to apply rules to concrete cases. In law likewise, —

> "the real criterion of one's knowledge of procedure is one's ability to apply its rules, as well as the principles of substantive law, not to cases where only the relevant and material facts are given, but to cases as they actually arise in everyday life and as they are presented in court." [1]

In attempting to provide a substitute for real practice, the moot or practice court was proposed. This has many advantages in that it gives a certain amount of technique in carrying a case forward to completion. Evidence is taken, briefs are prepared, and the pleadings made, yet the one serious drawback is that the situation is not real. There are no real witnesses, the whole thing lacks the human element. The student has no responsibility to protect the rights of the client, "the so-called witnesses are ready to his hand; they

[1] Morgan, E. M., "The Legal Clinic." *American Law School Review*, Vol. 4, p. 255, March, 1917.

are usually able clearly and intelligently to tell their stories, and to distinguish the material from the immaterial." [1]

In order to overcome some of the deficiencies in obtaining practice in legal procedure, the University of Minnesota in 1913 began an experiment in coöperation with the Associated Charities of Minneapolis. A young practicing attorney, who was later given as an assistant another young member of the bar, was in charge of the experiment, and was appointed an instructor in practice in the University Law School. Each student spends three weeks in this work. He works out the cases, interviews clients, takes down testimony, investigates facts, negotiates for settlement, and drafts the pleadings. His mistakes are pointed out and he is required to correct them. The experience gained is varied. About three hundred cases are handled a month. The cases are comparatively insignificant as far as the momentary consequence is concerned, yet they are illustrative of innumerable points in law. The course serves to round out the course in practice, it makes up the deficiency after the study of the principles, and it makes the work real — there are real cases tried. The student, moreover, is trained to deal with different types of individuals.

The objection usually urged against the legal clinic is that too few cases are tried to make it worth while.

[1] Morgan, E. M., "The Legal Clinic." *American Law School Review*, Vol. 4, p. 256, March, 1917.

Professor John H. Wigmore, Northwestern University Law School, answers:

"The objection that the range of cases in legal work is not sufficiently varied has sometimes been raised by members of the bar, even in large cities. But a full acquaintance with the work of an active legal aid society would dispel the objection. The variety of cases is certainly far greater than in any single law office. Do you know that the largest law office in the United States is the Legal Aid Society of New York with nearly 40,000 new cases annually? Do you know that the next largest law office is the Legal Aid Society of Chicago with 12,000 cases annually? The litigation arising out of these cases runs into every court in the country, and involves the use of practically every variety of legal document. In more than one case, the society's attorneys have helped to make law both in the supreme court and in the legislature's sessions."[1]

A brief survey of the methods that have been and are now being employed in the study of law will show that the use of the legal clinic is an outgrowth of an effort to make the law teaching not only more interesting, but more thorough and more practical.

The first method employed was the learning of the principles of law, with some illustrations. This method is no longer used in the best law schools. It is recognized that such a method gives no more than a superficial knowledge of the law. The technique of

[1] Wigmore, John H., "The Legal Clinic." *Case and Comment*, Vol. 28, p. 974, May, 1917.

the case, the points of contention, etc., are eliminated. The study of Blackstone as the only text illustrates this method. The merit of the case system as indicated by Ballantine —

"is mainly due to the fact that the cases present concrete problems in the application of legal principles to facts, and afford an opportunity for arguing how the rules of law should be formulated. But the student usually regards the cases, not as problems demanding solution, but as problems already solved by the judge, to be studied by him as authoritative statements of the law. His task is that of understanding the judicial opinion." [1]

In order to make the case system more vital Ballantine suggests the introduction of problems:

"Even if the professor puts problems in the course of classroom discussion, that subject having been covered, the student does not take the problem home with him for individual original thought. In reading the cases it does not occur to him ordinarily to compare the various cases that he reads. The average student does not seem to have any adequate conception of what he is supposed to do with the cases assigned. He does not know what he is looking for, or what to put his effort upon. The study hours are confined largely to assimilative reading, and the abstracting and absorption of the doctrines laid down in the opinion.

"Problems may then be advantageously employed

[1] Ballantine, H. W., "Teaching Contracts with the Aid of Problems." *American Law School Review*, Vol. 4, p. 118, June, 1916.

for advance study as well as for review. Instead of simply giving out problems in class after the cases have been covered, why not assign one or two problems for each meeting of the course, involving a practical application of the text or cases to be studied? Let oral or written solution be prepared, using the casebook or textbook as the place for original research. In this way the student will seek for and grasp the principles of a case as something to be used, not merely to be studied and learned for its own sake. Under such stimulus the student should be able to read many more cases, with much greater intensity of effort, concentration, and comprehension."[1]

The legal clinic is but an additional effort to provide a more real and vital method for teaching the principles of procedure. If the student in the legal clinic could actually do all the pleading and take complete charge of the case, it would constitute a project. To the extent that he carries the process toward completion, it approximates the project method.

The case method has been considered by some educators as the project method of teaching law, because, as they pointed out, the method of finding the points of law as stated in the cases is exactly the one the lawyer uses in practice. The case method does not meet the requirements of the project because it does not provide a natural setting for the problem. The case is usually solved and the mental activity which

[1] Ballantine, H. W., "Teaching Contracts with the Aid of Problems." *American Law School Review*, Vol. 4, p. 118, June, 1916.

is required of the student is the understanding of the case as presented.

The objections raised to the legal clinic are interesting because of the light they throw on the limitations of the project method in practically all forms of education:

(1) The legal clinic is inadequate to give a wide range of practical experience. Important cases in law will not be intrusted to the care of beginners.

(2) The training of the clinic is likely to be unsystematic, unless supplemented by a systematic review.

(3) The time taken by the clinic work is not justifiable.

(4) Since the state only may set up a court, it will be impossible for students to carry the case to completion before they are admitted to the bar.

The points in favor of the clinic are:

(1) It gives some actual experience. It teaches the method of carrying a case through to completion.

(2) The work in the clinic is done with a high degree of interest.

(3) It provides a natural situation.

The experience of the medical schools has shown that students may know the theory of diagnosis as represented in their ability to solve theoretical cases, and yet be helpless at first in a real situation. They may know the theory of operating, may have observed operations, may have helped in a few cases, and yet may fail when the responsibility rests on them to carry

out the whole operation. This is parallel to the handicap of the law student who knows the theory of the case and of court procedure and yet may not be able to carry out a case when facing a real jury with a real client.

A number of physicians and surgeons of Chicago, some of them recognized as leaders, were asked to give the outstanding deficiencies of the graduates of the leading medical schools, as observed when these graduates began their interneships. Two were given by each of the fourteen physicians and surgeons consulted:

(1) The graduates have a large number of facts, but they are not evaluated. All facts seem to stand on the same dead level.

(2) The graduates have no skill in surgery. Some reported that few had any idea of the simplest technique.

The medical schools in order to provide for this special technique have instituted the clinic. The material for the medical clinic is abundant and representative; the cases presented for treatment are real and are as difficult to diagnose and treat as the cases which the practitioner will meet. The difficulty is that all the students observe while the lecturer does the work. The students rarely have the opportunity to take part in the work.

The leading schools are now recommending that the graduates complete an interneship before going

into practice, for it is claimed that the variety of cases which the interne takes care of during this period of apprenticeship is likely to be greater than those met in the first ten years of practice. In fact, the great advantage which is claimed for the interneship is the large number and the variety of cases over which the young doctor must take complete charge.

After completing the interneship, the young doctor has confidence in himself for he has now not only solved hypothetical cases, but he has also actually received the patient, made the diagnosis, prescribed the remedy, watched the daily results, given directions to the nurse, made the patient realize the necessity of following directions, looked after the diet and at the same time studied the case, reviewing principles which had been previously learned and mastering new principles.

The method of teaching practice to the doctor by the clinic and the interneship illustrates in a measure the project method. The diagnosis of a theoretical case is not a project, for it does not arise in a natural setting. The interne taking complete charge of a patient has exactly the same situation as does the practitioner. The more intimately the principles of diagnosis can be studied in connection with real cases, the more thoroughly the principles and technique of surgery can be learned in a natural setting, the more nearly will it approximate the true project method.

If the clinic be used merely as a laboratory experi-

ment to illustrate principles learned at some previous time, then it is not a project, but merely a demonstration.

The project method applied to medical education would carry with it the following suggestions: Before the student *began* the study of surgery, diagnosis, etc., he would have a junior interneship, in which he would observe operations and diagnosis. This method has a precedent in engineering education at Rensselaer.[1] Before the students began the study of engineering they had, it will be remembered, an experimental term, gathering specimens and visiting shops and factories to get the setting for engineering and to see some of the problems at first hand. Paralleling this, the interne would study the processes involved in the operations, and the diagnosis. In other words, the problem in the cases presented would constitute the basis for the courses in surgery and medicine. Obviously, a large number of cases could not be observed or carried through but this could then be supplemented by a systematic study of cases not actually observed.

At the present, this would cause a rearrangement of the courses given in the medical schools. It would mean that some parts of the courses would be given in the hospital. This may be difficult to realize but the principles underlying the method are sound. As a substitute for this; it is proposed that the medical school require the students to spend a junior interne-

[1] See pp. 158–159.

ship in a hospital between the second and third years, and between the third and fourth years, — two three-months periods. Opportunity to help in operations and diagnosis would be valuable and would raise problems which would make the following years of study vital and real. It would be a very efficient method, if principles of diagnosis could be studied in connection with the real cases as they were presented for diagnosis in the hospital. This could be supplemented by a systematic study of diagnosis, to cover the cases which were not presented in the hospital.

In summarizing, it would seem that the most that can be claimed for the legal clinic is that it is a very desirable element in legal training but cannot be relied upon to give a systematic training which is necessary; unless more time is taken than can be seemingly justified by the results. As a method to be supplemented with other methods it is highly desirable because it carries cases to completion and evaluates material. It demands and usually obtains a high degree of interest. In so far as the student actually carries the real case to completion just so far it approches a true project.

The clinic has won its place in the medical profession. It is recognized as an indispensable element in medical training. The interneship is now regarded as a most desirable part of the course. If the clinic were made to include actual practice by the student and if the interneship were paralleled with a study of the principles underlying the cases they probably would be

more effective. The clinic is usually an illustrative lesson or a demonstration and the interneship is generally conducted as a practicum or as a laboratory exercise. The principles are all studied first and completed, then the young doctor is placed in the hospital to try to apply all these principles at once. Unless exceptionally careful supervision is maintained, many serious mistakes will result. If, after studying part of the principles, he could have a short interneship in order to use those principles and develop other principles as needed in the case — of course under supervision — the method would probably be far more efficient. The method would be improved if the student were asked to aid in taking care of the case and then were sent to the medical literature to determine the principles, remedy, etc. In this way, the various cases would compel him to seek out the principles. This procedure would, of course, be supplemented by a systematic training.

To the extent that the interne develops principles as needed in the case under his partial care and carries the case to completion, to that extent the procedure approaches a true project.

There must be recognized certain limitations of the project method in law and in medicine, for the state will not permit the student of law or of medicine to take complete charge of a case until after he has received a state's license to practice, which comes only after the completion of a systematic curriculum.

III. Journalism

The ideas embodied in project teaching are incorporated in the methods used by Harrington in the journalism courses given at the University of Illinois. This statement shows his attitude toward the ideas back of the project method:

"It has become increasingly evident to many of us who have shared in this new movement that the most fruitful instruction in journalism is that which realistically duplicates the conditions of the newspaper office. Here is no make-believe, but the real thing. In other words, the project method which develops many journalistic principles as needed in a natural setting of work pleasantly pursued, has been proved best adapted to fulfilling the ends we have in view." [1]

The atmosphere of a real newspaper office is faithfully maintained. The reporters are given a room with typewriters, current newspapers, telephones, and all necessary facilities for obtaining copy. Even the amount of time which the reporters spend in the office is faithfully recorded. It should be borne in mind that this is not a laboratory but a real newspaper office, for the products of this room are to appear in the daily newspaper. [2]

[1] Harrington, H. F., "Teaching Journalism in a Natural Setting. An Application of the Project Method." Educational Administration and Supervision, Vol. 5, pp. 198–199, April, 1919.

[2] "The output of our local room . . . reaches the eye of the public, and satisfies a real need. There is no system of red-ink corrections left by a scrutinizing teacher; no themes written on assigned 'literary' topics,

Opportunities are given the students to do different types of work, in fact, eight or ten distinct duties are assigned to each pupil every week. They furnish the university news for the two down-town afternoon papers, the large part of the news for the campus daily and for the university "News-Bulletin," a clipping sheet of authentic news sent to a large list of Illinois newspapers.

This method of teaching journalism well illustrates the project method. Principles of journalism are developed as needed by the student in carrying his story or his task to completion. The natural setting is present for the student has a waiting audience for his story, and he writes his story in a real newspaper office for a real newspaper. He writes now with the motive of conveying his story to his audience, not merely to the teacher for a school credit. The functional value of writing is thus realized. This method of teaching journalism develops interest, for a medium is furnished the reporters for their productions.

The shortcoming of the project method in journalism is the failure to give a systematic view of the subjects. After principles have been developed as needed in their natural setting, it will be well to have a logical or systematic review of the principles in order to avoid any gap in the subject. It may be difficult to have

productions which so often reach the waste basket." — Harrington, H. F., "Teaching Journalism in a Natural Setting. An Application of the Project Method." Educational Administration and Supervision, Vol. 5, p. 199.

every principle arise in its natural setting; hence the necessity of the systematic view.

IV. Modern Language

The direct method of modern language teaching incorporates most of the ideas of the project method. The aim of the direct method is to teach the modern language by imitation without much intervention of the mother tongue.

Some of the arguments in favor of the direct method are: the interest of the students is greatly intensified and the grammar is studied inductively, that is, rules are discovered as the need arises. In fact, Handschin asserts that —

> "The direct method makes use of all that is valuable in the other methods, and thus may be considered an eclectic method which is eminently adapted to our modern education with its varied demands." [1]

The advantages of the Gouin method, which forms an interesting preliminary to the direct method, are enumerated by the Committee of Twelve.

> "Out of the conviction that modern-language study should be made attractive, and out of the desire to adapt instruction to the known workings of the human mind, has come a system that seems more deserving of serious attention than the grammar method or the natural style of teaching.

[1] Handschin, Charles H., "The Teaching of Modern Languages in the United States," p. 100. U. S. Bureau of Education, No. 510, 1913.

"The Betis or Gouin method has the following obvious advantages: It trains the memory; it fascinates the student and holds his attention more closely than any other mode of teaching now in vogue; it gives the pupil, in a reasonably short time, a ready command over a large, well-arranged, and well-digested vocabulary; it affords through some of its conversational groups, an insight into the life of a foreign country." [1]

The direct method makes an effort to stage the problems in their natural setting. The atmosphere of the foreign language is faithfully reproduced and conversation is based upon the foreign language entirely. The desire to take part in the conversation spurs the student on to obtain control of the new language. The practice of having foreign language tables at the boarding houses is another step toward realizing a natural setting for the language.

An ideal project method of teaching the foreign language would be to take the class to the foreign country and then the real need for control of the new language would be made evident to the students. Our American soldiers learned French by this method. The devices of direct method, foreign language tables, clubs, etc., represent an effort to approximate this same natural setting.

The shortcomings of the direct method, vigorously pointed out by its opponents, are that it does not give

[1] Report of Committee of Twelve of the Modern Language Association of America, pp. 21–22. Published by D. C. Heath.

a systematic training in the grammar; the pupils often are unable to write correctly, pronounce correctly, or translate correctly. It is interesting in this connection to quote from Krause, an advocate of the direct method, to show that he makes provision in the direct method for systematic training in reading, writing, and the grammar of the foreign language.

"The direct method implies a direct appeal to the learner through the foreign language; that is, it teaches the language, and not merely about the language, as is done by an indirect procedure. The aim of the reform method is: Reading ability developed by means of oral facility. In this wise both aspects of language, the literary and the spoken, are considered. To make my position perfectly clear, I shall enunciate once more the five cardinal points in the reform of modern language teaching, *i.e.*, insistence upon good pronunciation, and so-called realien. Could you, indeed, conceive of effective modern language instruction if the teachers were not to lay great stress upon accuracy of pronunciation; if they should not vitalize and vivify their teaching by work in speaking; if they were not to bring their pupils into possession of usable grammatical facts; if their students could not read without translating; and if the foreign nation, through a study of its literature, of its people, and its customs, were not to be brought into sympathetic view and appreciation? In short, not the dead letter but the living word must be placed in the foreground of modern language instruction." [1]

[1] Krause, Carl A., "The Direct Method in Modern Languages," pp. 101, 102 Charles Scribner's Sons, 1916.

The direct method develops great interest and approaches the natural setting for the language. In this method, situations are so staged that the learners feel the need for control of the language and in obtaining this control the functional value of the language is realized. In so far as the method provides for carrying acts to completion in their natural setting it (method) approaches the project method. Provision must be made for a complete survey and systematic review of principles.

V. Insurance Salesmanship

The establishment of the School of Life Insurance Salesmanship at the Carnegie Institute of Technology is of interest not only to the insurance fraternity, but also to those concerned with the scientific study of education. The latter will be especially interested in the use made of scientific methods in the organization of the curriculum and in the methods employed in teaching.

Since the objective of this school was so clear-cut, — "to train men and women to sell insurance," — the author's problem of curriculum organization was not difficult as compared with the problems facing educators trying to organize curricula for elementary and high school courses, where the objectives are not so definite.

Two general principles of curriculum organization were followed in this work: (1) Material that is used

frequently by most of the insurance men in their daily work was considered necessary. This material was included in the course. The standard for the selection of material is based upon "frequency of use." (2) There are many situations which the salesman faces that require special knowledge and training. If he is not prepared for these situations, he either tries to handle them and makes mistakes or does not even try. Material which will help the salesman in this part of his work obviously must be included. Material included for these reasons is selected on the principle known as the "frequency of error."

The experience and methods of successful insurance agents have been analyzed and used. Standard sources, including periodicals, sales bulletins, and text-books dealing with life insurance and life-insurance salesmanship, have been critically surveyed to make certain that the essential facts needed by the salesman have been incorporated in this course. Material which is not essential to the selling of life insurance has been rigorously eliminated. The final choice has been determined by making an analysis of the job to learn just what it is necessary to know and to do, to meet the job's requirement. Hence the course includes the facts, principles, and methods of life-insurance salesmanship which are needed by the successful salesman.

After this material had been gathered and organized the problem of determining the method of instruc-

tion was attacked. It seemed to the author that the project method, with some modification, would be the most effective.

The true project method of teaching life-insurance salesmanship would be to have the men and women begin by soliciting insurance. The difficulties and problems which they meet would constitute the problem-material for the curriculum. From the author's point of view the true project method of teaching life-insurance salesmanship (beginning to sell at once) is probably the most effective, provided that the salesman has plenty of time to learn, is carefully directed and taught after each day's work, and provided further that in this training period, the "prospects" and the service rendered them by inexperienced salesmen be disregarded.

These objections are so significant that it seems necessary to effect a compromise method of instruction. The objections are similar to those in medicine and law. Clients, patients, and prospects alike, must be protected against malpractice.

What is the compromise form of teaching proposed? The students in this school are first taught the elementary facts in the principles and functions of insurance, and the principles and practical methods of life-insurance salesmanship. Sales talks are developed based upon the insurance needs of the individual. About the first half of the term is taken up with this study before the students actually solicit

insurance. During the latter half of the school period, time is provided for actual selling practice. The difficulties and problems which are met by the students in the actual selling are then discussed in the school periods.

This modified project method of teaching is justifiable because of the obligation to render service which the insurance fraternity owes to the clientele which it serves.

The author firmly believes that law and medicine could be learned by starting men to practice without any knowledge of law or medicine and permitting them to practice and learn as they go, very much as men in the insurance business ordinarily learn their profession. Not many of us, even those advocating this method of training insurance salesmen, would be willing to have such doctors or lawyers practice on us. Again, the protagonists of this method might maintain, policies are so well standardized that insurance men, whether trained or not, cannot do a serious injustice to their clients. The author recognizes that there is some merit in this statement and also that there are on the market standardized medicines which are used widely by all physicians. It is a fact, however, that most people would prefer to have their needs diagnosed by a trained physician before taking even standardized medicines.

Insurance salesmanship cannot be taught by reading about insurance salesmanship, no matter how extensive the reading. To learn salesmanship the actual

job of selling must be done. This actual selling has been provided for in the Carnegie School of Life Insurance Salesmanship, but provided for in a way which will protect the clients.

It may be appropriate to state here that there are many interesting examples of the project method of teaching and curriculum organization among the projects carried out at the Carnegie Institute of Technology.

The Department of Dramatic Arts is so organized as to give the student a general knowledge of the technique of the drama, approaching it by literary and historical courses, as well as through a severe training in direct technical work. The students are required to give public performances, and in carrying out these projects, they are required to give consideration to the making of scenery and costumes, dramatic literature, composition, music, and, in general, the complete work of production. The project here is the performance. The material of instruction consists of the facts, principles, and skills which are necessary to perfect this performance.

Similar projects are carried out in other departments of the Division of Arts. In the Division of Applied Psychology there are interesting uses of the project method in the work done by the Bureau of Personnel Research and the Bureau of Retail Selling.

VI. Summary

A brief survey of the literature dealing with the project idea in engineering, law, medicine, journalism, and the modern languages has been presented to show that the idea behind the term, as defined by the writer, is used with some modifications. The effort expended in all these fields has been to bring about a methodology which will tend to bridge the chasm between school tasks and activities outside the school. The project idea aims to present problems in situations not essentially different from those of life and to develop the technique of carrying the act to completion.

CHAPTER VIII

APPLICATION OF THE PROJECT METHOD TO SUBJECTS IN THE ELEMENTARY AND HIGH SCHOOLS

The literature dealing with the teaching of engineering, law, medicine, journalism, agriculture, and the modern languages shows that the project idea is used with some modification in all these subjects. A survey of the teaching methods in the elementary and high school subjects will reveal the same tendency.

This apparent uniformity of purpose, in accepting the same tendencies in methods of teaching, is no doubt due to an effort to develop a unit of teaching which will bridge the gap between school tasks and activities carried on outside the school.

The history of engineering education shows that the first engineering college curriculums laid great emphasis on logically arranged abstract knowledge. The principles of engineering were abstracted, codified, and made available for instructional purposes. No particular effort was made to teach the principles of engineering in connection with their natural setting. Few laboratories or factories were provided, and even the inspection of plants by the engineering students was not a part of the course. The shortcomings of this method of curriculum organization were soon recognized and

there arose a demand for laboratories and plants adequately equipped, whereby students in the engineering courses might participate in actual engineering practice.

The courses in the agricultural colleges were dominated at first by instructors who were intent on collecting and organizing a complete system of logically arranged facts. This material lacked concreteness and was not particularly related to the actual problems which the farmers faced. Schools of this character were severely criticized because they contributed little to farming practice. The curriculum was so organized that emphasis was placed on the acquisition of abstract subject matter. It was not until the experimental farms, the experiment stations, the coöperative plan of farming, and the home-project plan of teaching agriculture made their appearance in connection with the courses in agriculture that these agricultural colleges contributed widely to the solution of the farmer's problems.

The study of law was confined in the beginning to the reading mastery of Blackstone. Later the law school course was carefully planned, and the material organized and incorporated in a college curriculum. This course was more elaborate than the material found in Blackstone. The criticism that was made of the graduates of this course was that they knew a great deal about law, but were unable to practice successfully until after a few years of experience. In order to make the course meet more nearly the actual situation which the young lawyer would face,

the case method, the moot and practice courts, and finally the legal clinic have been introduced.

The medical schools have in turn faced the same problem, with the result that laboratories, clinics, and interneships have been developed and provided in an effort to make some provision for actual experience or for the teaching of the subject matter in its natural setting.

The emphasis which had been placed at first on the teaching of abstract subject matter in medicine, law, agriculture, and engineering, followed by plans to teach these subjects in their natural setting, has been described. This tendency has carried over into the fields of elementary and high school subject matter.

The tendency to make the subject matter taught in schools abstract at first can probably be accounted for historically. In the early division of labor, the teaching was turned over to the men who were or who became the scholars. The teachers soon became absorbed in the development of subject matter and withdrew from active participation in the affairs of the community. In this atmosphere, sometimes quite aloof from community life, the system of instruction was developed, with the result that the material was often taken out of its concrete setting, was abstracted, codified, and arranged in systematic form for teaching. Hence, the natural setting for subject matter was soon forgotten or disregarded.

This formal education carried on in the schools differed materially from that given in the home.

Education given first in the home was concrete. Information was acquired in its natural setting; it was used to modify conduct; it developed by meeting situations which arose for solution. Thinking out solutions was a very large part of this home learning. Schools carried on in the homes were informal; hence, they afforded opportunity for individual work and expression — in other words, the socialized recitation, as we now describe this type of teaching situation, was utilized. The school was frequently carried on in connection with the home activities, and the subject matter grew out of the problems which arose for solution in daily life.

After the school became separated from the home and was carried on at separate institutions with their teaching corps, the work became more formal and more abstract. The education furnished by these men who had lost contact with the world culminated in a system so unrelated to everyday affairs that to-day we are compelled to make an effort to formulate a method which will provide some of the good points of the instruction which had been carried on in the home before the advent of formal education. We are trying to bring into the school more concrete subject matter.

Criticism of the teaching in the schools has centered mainly around these four points: the teaching has emphasized learning through the memorizing of information, rather than through reasoning; information has been acquired for its own sake, rather than as a means

to modify conduct; no special effort has been made to provide a natural setting for the learning; the learning has usually been realized through a mastery of principles logically arranged, rather than by developing the principles as needed in the problematic situation.

The project, defined as a problematic act carried to completion in its natural setting, provides for a unit of teaching which has for its aim the correction of these shortcomings.

The teacher, in using the project method in any given field of subject matter, must determine first what the natural setting for the subject matter is. In other words, it is necessary at the outset to find out why people outside the school study or learn this subject matter.

One of the first questions then to decide is: What is the natural setting for this unit of teaching or this subject? The material is taught in its natural setting in the school if it is taught for reasons not essentially different from those causing people outside the school to learn this subject matter. Once the teacher determines the natural setting for the subject matter, it is essential to the project method that the same natural setting be provided in the school. The teacher must decide whether the material is learned by memorizing facts or by reasoning, and whether the learning is an end in itself or for the purpose of modifying conduct. It is an essential element in the project that the problem be raised first — the principles being learned as needed in carrying forward the solution.

A number of projects taken from the elementary and high school fields will be cited to illustrate the way in which the project may be utilized as a unit of teaching.

There has been no attempt on the writer's part to suggest a sufficiently large number of projects in any one given field of subject matter to teach the entire subject by the project method. The problem of organizing a whole curriculum on the project basis is quite outside the province of this book. The following projects are cited for the specific purpose of showing how the project method may be utilized in any subject. The many projects cited in the preceding chapters may be reviewed in connection with this chapter, and since many references were made to agricultural projects, no agricultural projects will be suggested in this chapter. The writer, however, wishes to call attention to R. W. Stimson's recent book, "Vocational Agricultural Education by Home Projects," published by The Macmillan Company. This book is one of the most comprehensive treatments of any subject by the project method.

The following projects, unless otherwise credited, were developed by experienced teachers who were students in the writer's class during the summer of 1919 at the University of Illinois.

Projects in English

Better English Week. — No plan has been more popular in the teaching of English composition than

what is known as *Better English Week.* This can be made into a real "live" project. Certainly no one will question the statement that better expression written or oral is one of the chief aims of the teaching of English. The alert teacher must stage a situation where the pupils will see that they need to use better English. One teacher has made and used the following plan to arouse a desire for better expression among the pupils:

About two or three weeks before *Better English Week,* she sent members of her class about the town to find out for themselves if business men put much value on good English. Some were sent to interview lawyers, merchants, and ministers. Others put the question to farmers, workmen on the street, to the mayor of the city, and so on, until they came in contact with many types of business and professional men.

They were asked to bring back to class reports of their conversations word for word as far as possible. Some of the results plainly indicated that men who used good English and knew how to express themselves could carry on a logical conversation which could be repeated point by point in good style. Other pupils could report only a few incoherent sentences and say that they had tried to get the ideas or opinions of the person interviewed but that he did not seem able to express himself. The class agreed that the persons who used good English and expressed themselves clearly were always the most interesting to talk to,

and in almost every case these persons were more successful in the business world than those who used poor English.

When the class realized this fact they verified their results still further. They wrote letters to a number of the most influential men in town and asked each one to make a list of qualifications which he thought essential for a young man or woman to have who wished to get on well in the business world. Nearly every one who responded included good expression in the list. Here was the place to introduce business letter writing. The pupils saw a need for it, were ready for it, and wanted it. The letters referred to above were written as a class exercise.

After this investigation the members of the class saw that they must learn to express themselves well if they were to be successful. The class wished to start a campaign for better English. The work was turned over to the pupils. Clever posters and slogans were made in the art classes. These were placed in classrooms and corridors on the Friday before *Better English Week*.

The members of the class jotted down every error in grammar that they detected in the classrooms or on the school grounds, made by either pupils or teachers. Every one was very careful during that week to avoid getting a "black mark." On Friday the reports were made and a record of the frequency of mistakes was put on the blackboard. This record showed that fewer errors were made during the latter part of the

week. The most frequent errors were made in the use of forms of the verbs *to go*, *to see*, *to do*, and *to be*, and these were chosen by the class for drill work for the following week. The drill work followed with a great deal of enthusiasm.

During this week the pupils began to cultivate the habit of observing their own English. This was followed by a drill on corrected forms. This exercise probably did more to improve their English than the same amount of time devoted to a formal study of rules and examples. The pupils were interested and pleased with the results. They asked to have another *Better English Week* the next fall.

This procedure illustrates a project. The situation of correcting errors arose in its natural setting — the making of errors on the playground. The students proposed drill on correct forms and this was carried to completion. Information learned in this manner will modify conduct (their expression).

A Project in Dramatization and Reading. — When some pupils in a grade school asked their teacher if they might give an entertainment just before Thanksgiving, they were told that if they would write their own play and present it their request would be granted.

The next day in the English class the pupils talked over what they thought would be a good theme for their play and decided that, since it was to be a Thanksgiving entertainment, probably "The First Thanksgiving" would be an appropriate theme.

Almost immediately one of the class who did much outside reading said that he knew where to find something about the first Thanksgiving and gave the name of the book, which happened to be one of the supplementary readers used in the school. The selection was assigned for a reading lesson the next day. Others suggested the names of other readers that contained information on the subject and these stories were read later. This furnished opportunity for carrying on reading in its natural setting. Some brought books and magazines from home and read them to the class, or told the story to the class.

When the class thought they had sufficient knowledge of the conditions and circumstances which led to the observance of the first Thanksgiving, they planned the writing of the play. All had some idea of what a play should be as they had read plays and presented them before. Different acts or scenes were decided upon, prominent characters were chosen, after which the real composition work was begun.

By the time the play was completed, the class had decided on the members who should impersonate the different characters. A little girl, a favorite with the class, was chosen for Priscilla; several Mexican boys wished to be the Indians; John Alden was impersonated by a tall slender boy. Then came the choosing of the costumes, which led to some more reading and to the study of pictures. The Pilgrim hats were made in the construction period. Visits to the forestry supervisor

were made to get permission to cut down some small pine trees for the stage. Thanksgiving songs were studied in the music period; the play was memorized in the language study period and practiced in the reading period. A few days before Thanksgiving, written invitations were sent out by the pupils to the children of an upper grade asking them to be present at the entertainment.

This project cut across the subjects of reading, language, and construction work. The motive to carry out this project arose with the members of the class. It was carried to completion in its natural setting. The play was originated and was given for reasons not essentially different from those which would have prompted the giving of a similar play outside the school. Many minor problems arose as the project progressed, which were solved by the members of the class.

A Project in Letter Writing. — During the latter part of a recent school year, Madam Schumann-Heink gave a concert in a small city in Illinois.

The prospect of her coming aroused great enthusiasm among the townspeople. The school children were especially interested since their music director used the event as a means of motivation in his department.

On the morning of the date set for Schumann-Heink's appearance, the writer happened to be visiting in a fourth grade room. He asked the pupils whether they

would like to write letters to the great singer. One may easily guess their reply: "It would make too many letters if every child in the system wrote one, wouldn't it?"

"Then let each child in this room write a letter, have the best one selected by a committee of teachers, attach the signatures of the other 2200 children in the system, and send it to Madam Schumann-Heink by messenger." So the *project* was carried out.

Was this motivated exercise in letter writing really a project? Is it possible that the subject of letter writing, which unites the arts of penmanship and composition, can be taught by the *project method* or must this new method be limited to the manual, agricultural, and domestic arts? Is it possible that children of the fourth grade may do profitable work when their work is thrown into its "natural setting," or must we hope for an application of this method in the upper grades and high school only? The writer will attempt to answer these questions and similar ones that might arise, as follows:

The project implies an act carried to completion as against the passive absorption of information.

Before the children began to write the letters they were given no information; the task consisted only of an act carried to completion — the letters were written and one of the letters was sent to the addressee.

The exercise in question developed the problematic

situation demanding reasoning rather than merely the memorizing of information.

This was a problematic situation in that it was one involving reflection, and it called into life the memorized information of the pupils by showing them a social use for it.

By emphasizing the problematic aspect the priority of the problem over the statement of principles is implied.

Thus the exercise paved the way for the restatement of principles already learned and gave a strong reason for learning more about letter writing.

The exercise made provision for the natural setting of problems rather than an artificial setting.

The schoolroom is as natural a setting for letter writing as any other; witness the surreptitious letters written by older pupils and teachers in this setting. The school is frequently a *more* natural setting for letter writing than the home.

What Poems Written during the Great War Will Live? [1] — The project of collecting poems of the Great War originated in a desire to have informal recitations, to cultivate home reading, to stimulate a love for poetry, and to form a connecting link between the school and the home.

War and anything related to it held the center of the stage in the autumn of 1918. The literature of the

[1] A project developed and reported by Mrs. Mary M. Pierce, teacher of the sixth grade, Henry Freeman School, Rockford, Illinois.

war, particularly the poetry, was read by all. Some of the collections were worth while, others were not. The class decided to make its own collection.

The children were asked to read several poems and bring their favorites to class. They brought in several score, which were read to the class with comments. Some were read many times. The class measured every selection by two rules: Has it enduring thought? Is it well expressed? In order to carry on this sifting process, the class was divided into groups, each group with a leader, for the purpose of reading, comparing, and discussing the poems. Each poem which went into the final collection was voted on by the class.

We found in this work abundant opportunity to discuss such topics as the brotherhood of man as exemplified in the war, and as a strong factor in modern civic and industrial life; the worth of true manhood in every walk of life; sacrifice for country; honor of flag; citizenship; woman suffrage; and other related topics.

This final collection of poems was printed as a booklet and these books have gone into the homes and have been read by the children's families.

Following this work of selection and the printing of the material, the pupils spent a few months in reading some of the world's standard poetry, selections from Whitman, the Carys, Wordsworth, and Longfellow. The results showed that this project developed in them a love and an appreciation for the standard selections.

Projects in Civics

A Project in Community Civics.—This project is a rather comprehensive one, and in working out the

details it will require much thought and time, but it represents a contemplated plan to be carried out within the school year as a basis for an eighteen-weeks course in Community Civics in a community with a population of a hundred thousand. The whole project includes the preparation of a pamphlet intended to develop, by actual investigation on the part of eighth and ninth grade pupils, three sets of facts about the city in which they live: (1) What is the existing state of civic affairs in my city? (2) How does this compare with that of other cities of similar size and industrial conditions? (3) What needs to be done in "my generation" (meaning the pupil's period of service as a citizen just beginning) to make it the best possible city of its size?

The whole preparation of a summary of this kind could not be done, perhaps, in less than three or four years, if worked upon by pupils all over the city. To make concrete one year's work as a beginning, the best plan is to have the pupils prepare a survey of the civic life of the section of the city in which the school is located, presenting facts regarding the labor conditions, the recreational facilities, the transportation facilities, and health conditions. In eighteen weeks the pupils should be able to examine these four problems for their district as a work in civics and to embody the results in a pamphlet.

How Can We Best Americanize Foreign People in

Rockford?[1] — A few months ago, in our history class at the Blake School, we were discussing the causes operating against the Americanization of the recent immigrant population in our country. We discussed the plans utilized by the national government to assimilate this great foreign element. A long, interesting discussion, centering around the living conditions and characteristics of our foreign group, followed.

From a study of the national problem of immigration and its influence on national life, the class brought up the question of the influence of immigration on the problems of city life. The question of what the nation was doing to assimilate the foreign element brought the class face to face with this local problem: "What can Rockford do to Americanize its foreign people?"

In order to accumulate material bearing on the problem and to have a general working knowledge of the distribution of the foreign element in our city, two boys offered to serve on a committee of investigation and to make a general survey of our alien population and their problems. By consulting the heads of churches, the school census, and naturalization courts they found that our problem concerned more the peoples from southern Europe; indeed, in our own district, approximately thirty-two per cent of the children represented homes in which one or both of the parents were immigrants from this section. We tried to

[1] A project developed by Laura E. Ryan, teacher of the seventh grade, Blake School, Rockford, Illinois.

find out not only why they came to America, but some of the problems that they had to meet. The library was a great help in securing information and, as each child brought before the class the results of his reading, we acquired a great deal of information bearing on the subject.

The Italians, Greeks, Lithuanians, and other foreign children in our midst furnished additional information. One little Lithuanian boy, scarcely ten years old, on being asked why his father came to America, wrote: "My father was born in Russia. When he was a little boy the Czar would not let people get an education. We had some cousins in America. They wrote to him. They said there was a good government here. So he came and worked in a coal mine in central Illinois. At night he went to night school and took out his citizenship papers. He would not go back to Russia for anything. He has a lifetime job." Another girl born in Italy gave us some valuable information in regard to the characteristics of the Italian race and of the way the foreign-born child is Americanized in the public school by coming in touch with American life.

This study of the characteristics of our foreign population created a desire on the part of the boys and girls to learn more. The resources of the public library were then drawn upon. Each child was urged to carry a notebook and to jot down interesting things bearing on our problem. It was a source of great satisfaction to me to find them so enthusiastic over the

books that they were reading, — "The Immigrant and the Community," by Abbott; "The Promised Land," by Mary Antin; and the "Making of an American," by Jacob Riis. Various articles bearing on the problem from some of our leading magazines were brought into class for discussion. We found articles in the *Literary Digest* and similar publications, and the Americanization pamphlets published by the Department of the Interior very helpful.

We next made an inventory of all the agencies in the city that might help to bring about an early assimilation of these people who in most cases are eager to learn but have never had the opportunity. On enumerating the forces, the public library, evening schools, factories, social centers, Chamber of Commerce, churches, moving pictures, kindergartens, and newspapers were all mentioned. The purpose was to endeavor to inspire the foreign people of our neighborhood, through their children, with the spirit of American ideals and American citizenship. Believing that the most important service the Americanization worker can give to the foreign-born is to personify the best that America has to offer these children, the future citizens of Rockford were shown that it was their duty and obligation, by living up to the highest ideals, to make the immigrants' absorption into citizenship possible. As one of the strongest bonds of Americanism is unity of language, it became the aim of the child to speak the English language in

the home, that the parents might learn the duties and obligations of Americans.

Our class numbered twenty-two children. We divided it into committees of two to interview the heads of the social welfare organizations, in order to find out what they were doing and planning to do. In nearly every case the committees met with ready response and received many helpful suggestions. Through their investigations the pupils had already become acquainted with many city officials. Throughout our entire study of the projects concerning community welfare there was constant interest and a keen desire to know more. I should like to quote here the report brought in by the two girls who visited the Social Settlement to find out the nature of the work they were doing:

"On Saturday afternoon we paid a visit to the two social centers, and found each engaged in doing a valuable work. The Montague House under the supervision of the Rockford Woman's Club, and St. Elizabeth's under the Catholic Woman's League, through their work with the little children in the kindergarten and the mother in the home, have accomplished great good. These people at the settlement are surely doing their part in the assimilation of the foreign homes. They also told us that every woman in the Rockford Woman's Club had planned to make friends with at least one foreign-born resident and work for American standards of living. While we were at these centers we had a chance to see the little foreign children at work.

The woman in charge urged us to tell all the little foreign children in our midst about the social center."

This research work carried on by the children had an important bearing on our subject. Our next step was to get in touch with what other cities were doing, to find what standard had been attained in other communities. Each child wrote a letter to the Chamber of Commerce of some city interested in the work of Americanization, the problems of which were similar to our own. Here is a sample of one of the letters sent by one of the children to the Chamber of Commerce of Cleveland:

Rockford, Illinois,
April 9th, 1919.

Chamber of Commerce,
Cleveland, Ohio.

Dear Sirs:

Our history class at Blake School in Rockford is trying to get in touch with what other cities are doing in the way of Americanization. We heard that Cleveland had been carrying on the work for several years. Would you kindly give us some suggestions?

Yours very truly,

In a few days this little girl was very much pleased to receive a reply from the Cleveland Chamber of Commerce telling of Cleveland's method of Americanization. The books we received from Cleveland were very helpful. The work there seemed to center around two divisions: first, bringing the foreign-born home into closer touch with the language, customs, and ideals of

America; and second, giving to the native-born American an understanding of the racial and political sympathies of the foreign-born. Other cities sent helpful information. In this way each child had a chance to become personally acquainted with the social service work in other cities and brought much valuable information to the class.

After this discussion the question naturally arises as to what this study of Americanization will lead. What value will it bring to the individual child? So far I have attempted to show you that, in the solution of our problem, subject matter was developed, the work was motivated, and that research work was carried on by the children. I shall try to show the definite outcome of the problem and its value as a training in citizenship and practical efficiency.

The class, as a direct result of our project, has formed an Americanization Club for the purpose of getting better acquainted with the people of the neighborhood. This club was very fortunate in securing the chairman of the Americanization Committee of the Daughters of the American Revolution to speak at one of the meetings. She not only talked to the class on the local problems, but brought great inspiration and help by inviting the class to witness the impressive ceremony of conferring final citizenship on fifty aliens. Many members of the class were present and felt, after witnessing the naturalization ceremony, a greater desire not only to urge the taking out of citizen-

ship papers, but to have some share in the Americanization of the new citizens.

These boys and girls have acquired first-hand knowledge of some of the life conditions of our city. Their investigations have brought the right attitudes towards life. All the boys and girls have a greater interest in public problems, have a desire to read more along these lines, are filled with a desire to serve. I shall feel that the social aims for which it was intended, good citizenship and practical efficiency, have been attained if, in their Americanization Club, they will endeavor to continue the good work by helping to arouse public opinion and by keeping in touch with the best efforts of other communities. This working together is one of the best influences for good citizenship. The mutual understanding and appreciation of the foreigner in our midst cannot help being of benefit to the community in which we live. This problem led to social service by showing the children how they might coöperate, not only to bring about better conditions in their own city, but to further the high spirit of good citizenship — the goal of education.

If through the study of Americanization the class become interested in other community problems, if they realize the necessity for really Americanizing the foreigners in our midst, they will be ready in the years to come to vote intelligently and to do their part in furthering the growth of democracy and democratic ideas of government.

Another Project in Community Civics. — The following account of a school experience furnishes an excellent example of a project in civics.

The high school had no playground readily accessible. A vacant lot adjoining the school campus was all that the boys had for a playground. The lot passed into the hands of a man who was not interested in boys. He posted "Keep out" signs at every corner and informed the principal that the boys were to play on the lot no more. The next day the signs were all gone and the boys went to play as before.

The boys were taken to task by the principal. They maintained that they were not injuring the lot and that they ought to be allowed to play on it. The principal agreed with them in that contention, but showed them that they were going about the matter in the wrong manner. He suggested that the boys petition the board to buy the lot for a playground. The boys readily fell in with the suggestion. It was decided that it would be wise to consult the owner first to see for what price he would sell the lot. A committee waited upon the owner and succeeded in getting from him even better terms than they had hoped for. They then went to the Board of Education with a proposition, and, by dint of good management and good luck, accomplished their purpose. The whole situation was carried through in such a way that the boys came to have a higher respect for law and order than before, and to know more about the

ins and outs of business. This situation was referred to from time to time in the civics class.[1]

Projects in Hygiene

Anti-Fly Campaign. — I have not personally carried this project to completion in my own school work. Once, while teaching a high school class in physiology, I did some of the preliminary work, but, through inability or ignorance of the technique of project teaching, I was unable to complete the unit. The identical project was carried out by Mr. J. L. Pricer in his normal school classes in biology at the Illinois State Normal University. While I am not indebted to Mr. Pricer for the idea, the project as reported here is essentially as he carried it out, and his experience, as I have heard him relate it, together with my own observation of the work, is evidence that the plan is workable and worth while from the standpoint of (1) immediate results, (2) interest on the part of students, and (3) information in biology derived by the students.

A project of this nature cuts across several subjects in the curriculum and might for this reason be undertaken with profit in any of these courses, or perhaps best in all of them, if the coöperation of the several teachers can be secured. If the project arises in

[1] Attention should be called to two bulletins "The Teaching of Community Civics" and "Civic Education in Elementary Schools as Illustrated in Indianapolis" published by the U. S. Bureau of Education. There are many suggested projects in community civics outlined in these bulletins.

biology, the biology teacher will, in summing up the work at the close of the course, emphasize the principles that apply to his field. The project might arise in a course in hygiene, in which case the principles emphasized will be slightly different. It is conceivable that the identical project could arise in journalism, physiology, domestic science, or even in manual training. It seems to me that it belongs primarily to community civics in the discussion of public health. In its various ramifications it should utilize material from other subjects suitable to the purpose. It will in this way illustrate clearly the complexity of many problems in social science.

The plan of the fly campaign, the slogan of which was "Make Normal a Flyless Town," occurred to Mr. Pricer as a means of vitalizing the work in his biology classes. He knew the life history of the fly and its common breeding places, also the means of preventing breeding. With this knowledge he believed he had a real message. This he gave to his classes and he said "they appeared to understand." He therefore expected great results when these students went out into teaching. But years went by and no such results appeared. He therefore reviewed his work to find out what was the matter, and concluded that his students discounted his teaching, since he himself had not accomplished such results. He then laid the plans to make the community flyless.

The work started in the normal school classes during

the winter term. The students were instructed as to the facts about flies in view of the coming campaign. The plan was appropriately advertised among the students and faculty members likely to be called upon for any part of the work. Since it was conceived that the coöperation of the children would be advantageous, the plan was presented in the training school by the student teachers. It was considered important that no one should engage in the propaganda work who did not himself understand the problem.

It so happened that Normal at this time possessed a unique weekly newspaper, supported entirely by advertising and delivered free of charge to every house in town, — a "free lance" publication which could take up any policy without fear of offending subscribers. The coöperation of the editor was secured and numerous short paragraphs and articles on flies were inserted with the news. As everybody in town read the "Normalite," everybody soon knew of the campaign.

As a further assurance that every one should know and understand the plan, the students divided the town into districts and to each district an individual was assigned to make a sanitary survey. In so far as possible the more diplomatic of the students were chosen for this work. The student made a call at each home in his district. He announced the purpose of his call in the interest of the fly campaign and further explained the plan. He then volunteered to assist the householder by looking over his premises and pointing

out the places that needed cleaning. It had been previously arranged with the University farm management to supply wagons to haul away all manure placed on the alleys, as it could be used on the farm, and the city authorities provided means of hauling away all tin cans, bottles, and other rubbish. The student, if necessary, emphasized the fact that everybody else was joining in the campaign and that premises might be listed as sources of infection in case they were not cleaned up. If the householder absolutely refused to have anything to do with the plan, the place was surveyed at safe distance in spite of this refusal and the conditions noted were thus made a matter of record at headquarters. Business houses were likewise interviewed.

At about this time a Congressman from the district, hearing of the campaign, wrote Mr. Pricer of certain government publications and volunteered to send them to every home in town if the addresses could be supplied. Mr. Pricer supplied him with a telephone book and each subscriber received the literature.

When spring opened, a clean-up week was designated. The wagons were at hand and kept busy. Incidentally, the University farm received a great deal of free fertilizer. As it was found unsafe to allow manure to accumulate for more than a week, trips were made weekly by the wagons and the manure was scattered on the cornfields, where, exposed to sunlight, it no longer formed a breeding place. A few

people who at first refused to coöperate, seeing the advantages of the campaign, were glad to come in. By the end of the summer, only one man was known to oppose the work, and this because he had some pigs and did not see how they could be kept clean.

A difficulty was experienced at the University dairy barn where flies persisted in spite of many traps and the weekly cleanings. But it was determined that the University should not be the "slacker," so cleanings were made daily. This also added to the assurance of clean milk from that dairy.

A problem remaining unsolved, according to Mr. Pricer, was that of the vacant-lot cow pasture, a few of which existed in and near the town. A special study of this problem was made by the students. It was noted that the usual cow fly differs somewhat from the common house fly, but to all appearance it is equally capable of carrying disease. An experiment was performed in one of these cow pastures by placing a wire cage over a pile of droppings that had been exposed to flies. After flies had hatched, the cage was removed and the contents scalded. More than four hundred flies were counted. The most feasible solution of this problem was found to be that of having a brood of chickens or a few pigs follow the cows. By working in the manure they scattered it, and by exposing it to sunlight prevented much of the breeding.

An interesting problem developed in the calculation of the distance that an adult fly travels from the breed-

ing place. Horseflies have been observed to travel long distances while following the animals. It was concluded, however, that the distance traveled by the house fly was comparatively short since the town of Normal borders on Bloomington, where similar precautions were not taken, yet this fact did not materially affect the success of the Normal project.

Correlated with the work of the fly, the normal school classes studied other insects and the interest ran high. The problem of insects as disease carriers was easily covered and the principles of entomology were amply illustrated. The results were evident. The principles learned were summarized in the classes, their relations to life problems being evident.

As stated at the beginning of this paper, we believe that this project arises most naturally in community civics. The civics teacher will emphasize different principles: the nature of the organization, coöperation, the influence of the press, and other similar features. Biological facts will receive attention only when a knowledge of them is necessary to accomplish the purposes of the work. The various points of contact of the social sciences are, by definition, as varied as the experiences of life itself. No clearer illustration of this could be found than by taking such a project and carrying it to completion.

Prevention of Communicable Disease. — The routine of school procedure frequently calls for instruction in health matters when the need is only potential. As a

result, when the situation arises the facts memorized are either forgotten or fail through lack of initial motivation to carry over into action. It is a common spectacle to find the individual who has received such instruction helpless in the face of a real situation. There may be few instances in which disease problems may be studied at first hand, yet it seems to the writer that the following opportunity is so evident that it should not be overlooked by the wide-awake schoolmaster.

It is a matter of common observation that an epidemic of some sort occurs among school children practically every year. This may be made the basis of a project in public health.

Assume that the epidemic, or threatened epidemic, is the very common one of measles. This is a highly contagious disease affecting children primarily, and is responsible for a goodly proportion of the child mortality as well as for numerous more or less serious after-effects. The epidemic commonly starts by single cases. This is the time for activity on the part of the school authorities, who may frequently prevent much suffering by prompt action. The children of the school may be organized for a project, the result of which will be that the facts of prevention, treatment, and final disinfection will be forcibly impressed on their minds.

When the first case of measles appears, the sanitary facts relative to the disease should be taken up in the

school classes and explained to the children in simple language. When the children understand in part the nature of the disease they may, through a committee, call upon the health officer and offer their services in preventing the spread of the disease. It would be a foolish health officer who would refuse an offer of this value.

The tactful teacher will see to it by previous conference with the health officer that he has at hand the pamphlets issued by the state department of health relative to measles. These give, for the information of the public, the legal provisions and also facts that will be of use in controlling the disease. The health officer could, at this time, express his appreciation of the offer and explain to the children some medical facts that will assist them in avoiding the disease. The nature and necessity of quarantine will be clearly understood and the whole-hearted support of the children will assure the carrying out of its provisions. This literature may be used as the basis of the physiology recitations until the children understand it. The children should be pledged not to violate the provisions of the quarantine nor the provisions of the law in case any one of them contracts the disease. They will be cautioned as to the dangers arising from failure to heed the precautions pointed out by the state board of health in its literature. Through the children, parents may learn of their part in preventing the spread of the disease and difficulties need not

arise in connection with failure to obey the law because it was not understood.

As the occasion may not be propitious to study all communicable diseases in this way, this will be a fitting time to make a general summary on contagious diseases. A suggested outline for the study of each disease is as follows:

I. Source of infection.
II. Agents of infection.
  a. Contact. *b.* Droplets. *c.* Water. *d.* Milk. *e.* Air. *f.* Other agents.
III. Conditions favoring infection.
IV. Care of the patient.
V. Precautions.
  a. Quarantine. *b.* Disinfection. c. When to call the physician. *d.* Final disinfection.
VI. Duration of the disease.

A summary on communicable diseases issued by the United States Public Health Service may be used at this time and left with the pupils for future reference.

An Anti-Sneeze Campaign.[1] — "Just after the Christmas holidays, school attendance was seriously interfered with by an epidemic of severe colds, grip, and similar respiratory diseases. Nor were pupils in school the only sufferers. Probably seventy-five per cent of the people were incapacitated for or seriously handicapped in their regular occupations by

[1] Project developed by Mae Creswell, Supervising Critic, Iowa State Teachers' College. Edited by C. W. Stone, Iowa State Teachers' College.

these maladies. The basis for this statement is reports from the homes given by pupils in the school. Pneumonia claimed many elderly people for its victims. And this community was not alone in its suffering. 'The grip' became a matter of serious concern from New York to the Pacific.

"Since boys and girls as well as grown people were instrumental in spreading the disease, it was deemed advisable to devote some time in school to the study of the means of avoiding the increase of the contagion. The work was known as the Anti-Sneeze Campaign. Certain phases of the study were taken up in each grade.

"The usual procedure was a discussion led by the teacher. Then the pupils made further use of the information gained, in language or composition and drawing. First the census of the prevalence of the disease was taken. The following furnishes an example of the lesson for the fifth grade:

"'There are many, many tiny plants in the world, so tiny that if we look at them with a microscope that makes them from 300 to 500 times as large as they really are, they look then only specks. They are of many shapes, some rodlike, some round, some corkscrew-shaped, and so clear as to resemble a tiny bit of gelatine. Nor are they green at all as you expect plants to be. They are called bacteria. Some of them are useful, as the ones that our mothers or the bakers put in our bread to make it rise. Another kind causes milk to sour; another causes waste substances to be

broken up, decay we say, so other plants can again use the material. A few kinds are harmful and are known as disease germs. One kind causes grip, another diphtheria, another tonsilitis, while pneumonia and abscesses in the ear are caused by other germs. Many other diseases that we call contagious are due to germs.

"'These germs increase very rapidly when they have proper conditions. You remember how soon the bread rises after the yeast is put in it. One tiny plant may become fifty or even a hundred in an hour's time. Disease germs need to be kept at body temperature and require body tissue for food. Sunshine is fatal to them, hence they find the inside of our noses, throats, and lungs well suited to their development. Enlarged tonsils and adenoid growths make such good places for these germs to grow that doctors are anxious to have the adenoids removed and often the tonsils.

"'A healthy nose and throat is warm enough and moist enough for the germs to grow, but their food is lacking. Just let us take cold by leaving off our rubbers some sloppy day or in some other way, and the blood rushes from our skin, hands, and feet and clogs the blood tubes in our noses and throats. The delicate linings of the nose and throat become swollen, very red, and an abundance of mucus is secreted. We say, "My nose runs." These red swollen linings form good places to grow colonies of disease germs. A few germs come floating along in the air we breathe and finding so good a place to grow lose no time in getting to work. Within twenty-four hours we may be suffering with tonsilitis, gasping for breath with diphtheria or pneumonia, or nearly wild with earache. All of these germs give off a poison which enters our bodies and makes us feel sick all over.

" 'Mother Nature tries to get rid of anything in our throats by having us cough. Or if the trouble is in the nose, the air is driven out through the nose and we sneeze. There is no sneeze unless there is something irritating those delicate linings of the nose. If there are colonies of germs growing in the nose, a sneeze is bound to carry some of them out. Just in the same way is the air coughed out laden with them. Not every cough or sneeze carries disease germs but probably ninety-nine out of every hundred do.'

"The pupils then were able to carry on the lesson by suggesting how to care for the sneeze and coughs. Some of the commonest statements were, 'Do not sneeze.' 'Turn away your head when you sneeze or cough.' 'Cover your nose with your handkerchief when you must sneeze.' 'Have a clean handkerchief every day, oftener if you have a cold.' 'Keep your handkerchief in your pocket when not using it. Do not wave it about.' 'Be careful not to take cold, then the germs can't grow.'

"The grades from fourth to high school worked out 'Safety First' rules during their language period. All endeavored to make their epigrams real danger signals. Rhymes were used effectively. The high school pupils wrote on the most effective means of presenting the dangers of promiscuous sneezing and coughing to the general public. The results of their work suggested many unique means of advertising. Local papers expressed a willingness to publish some of the best ones. The seventh grade have lettering in their draw-

ing work and they made some of the epigrams into effective posters. Other grades planned 'Safety First' posters to be placed in conspicuous places around the school building.

"The following were chosen from the fifth, sixth, seventh, and eighth grades:

"'Run away from the sneezers if you want to keep well.'

"'Dangerous germs are scattered by a cough or a sneeze.'

"'Kershoo! A thousand grip germs fly in the air.'

"'Always cover your nose and mouth with your handkerchief before sneezing.'

"'If you are a Ger(m)man go a Russian to the doctor.'

"'Are you prepared? A handkerchief in nick of time
Will save your precious health and mine.'"[1]

Projects in Geography

Beginning Map Study. — The lesson is begun by arousing the pupil's interest in, and demonstrating a need for, the subject to be studied. The teacher asks, "Bobby, does little Donald who lives across the street

[1] Editor's Note.—As Miss Cresswell shows in this article, even an ill *may* be turned to considerable good. As is evident in this account, pupils study health problems — as other problems — most vigorously and effectively when impelled by a *felt need.* Under such circumstances pupils readily join the teacher in the study required to satisfy the need; and the teacher is thereby freed from the all too common "bugbear" of *making* the work interesting. It is interesting because it is what it is, and is being studied *when* it is. C. W. S.

from you come to our school?" Bobby says, "No," and the teacher immediately asks, "Why not?" Well, Bobby probably does not know, so you ask, "Frank, does James who lives across the street from you come to our school?" He answers, "Yes," and so the question immediately comes, "Why does James come to our school and not Donald?" Some one will probably answer, "Because Donald does not live in our school district."

The teacher then asks the pupils if they would like to know something about the size and shape of our school district. It is then suggested that a picture of it be made on the sand table. The interest is now aroused and the pupils proceed with their work. Soon various questions arise, such as: Are the blocks square? Are all the blocks exactly the same size? Where is north, south, east, and west? How large can we make the blocks to have room for all the blocks on our sand table?

Later the streets are named and each child locates his own home. A piece of chalk or wood may be used to represent a house. All important buildings, such as stores and churches, may be located and represented in any way the children may choose. This is then reproduced as a map on the blackboard; at this point the problem of the scale is taken up.

Teaching Longitude and Time. — The following description of a project illustrates how well seasonable topics may be utilized.

In November, 1918, a seventh grade class began the study of "Longitude and Time," a very short time after the armistice had been signed. The local newspaper contained the statement that the armistice was signed the 11th hour of the 11th day of the 11th month. *If* this statement were true, at what time should the bells proclaiming the signing of the armistice have rung in Urbana? How would you account for the fact that the bells rang before this time?

Pupils were so anxious to recite that they could hardly stay in their seats. They all wanted to talk at once; so they were all given ten minutes to write their solutions on paper. For once, they wished to write, for they had something to say.

Then one girl raised her hand and said, "I have a solution of this problem, and I'd like to challenge the rest of the class to find any flaw in my arguments." Of course the class accepted her challenge; and as she stood before the class the next thirty minutes arguing with her schoolmates, no football game could have been more exciting.

What Part Has Transportation Played in the Development of Our Country? [1]

The aims of this lesson were:

To produce in the minds of the pupils an appreciation of the value of transportation in the development

[1] This project was reported by Miss Margaret Long, of Rockford, Illinois.

not only of our own people and country but also of other nations.

To give the pupils a knowledge of the meaning of transportation and its relation to all the great industries in the world.

To develop judgment, organization, initiative; skill in reproduction and representation.

We began by having the pupils collect material for making books by arranging and mounting pictures, clippings, and drawings, relating the work as far as possible to the subject matter in geography and history.

A shelf was placed in the corner of the room for a transportation exhibit. Some of the simpler vehicles of transportation were made by the pupils. The more complex forms were represented by toys and mounted pictures. The arrangement on the shelf showed the progress from the primitive to the more complex forms of to-day. The following outline gives the content of the books made by the class and shows the order of arrangement. The topics were discussed in class after the members had gained information on each from reading and research, observation, and personal experience.

1. An introductory page on the importance of transportation, in primitive times; in present times; in the speedy movement of troops, war munitions, and food.

2. List of the different modes of transportation in Rockford, Illinois.

3. A trip taken by the pupil describing modes of travel enjoyed.

4. A brief story showing the relation of transportation to the three great needs of man: food, shelter, clothing.

5. A study of the following outline showing how transportation was a factor in the development, growth, and civilization of nations, especially that of the United States.

I. Kinds of transportation:

1. Early Means:
   By land: on foot, in carriages, by stage coaches, on trails; roads, including Roman roads. By water: canoes, rowboats, sailboats, flatboats; first steamboat on Hudson River, Mississippi River, Great Lakes, Atlantic Ocean.
2. Modern Means:
   By land: railroads, comparing early roads with trunk lines of to-day; automobiles, suggesting their relation to the demand for better roads, and the effect of better roads on the farmer; auto trucks. By water: canal boats, suggesting the development of the important canals such as the Erie and Panama canals; freighters on the Great Lakes; ocean liners, comparing these with early steamships; submarines; battleships; destroyers. By air: aëroplanes, describing kinds and use; balloons.

The following topics relating to subject matter were used as far as possible in carrying out the foregoing outline.

I. Travel in Colonial Days.
   1. A trip from Boston to Philadelphia.
   2. Washington's trip to Fort Le Bœuf.
   3. Washington's journey from his home in Virginia to New York City.
   4. With Daniel Boone in the wilderness.

II. Later Times.
   1. First steamboat ride up the Hudson.
   2. First steamship trip across the Atlantic.
   3. A trip on the Baltimore and Ohio Railroad in 1835.
   4. A trip on the Baltimore and Ohio to-day.
   5. Lewis and Clark Expedition.
   6. A journey across the continent to-day.
   7. Early Forty-niners.
   8. A trip on the Great Lakes with observations.
   9. Experiences on a transport from New York to Brest.
   10. What part has the aëroplane played in present-day history?
   11. What part, in your judgment, will the aëroplane play in the future?
   12. Is the submarine of any use commercially?
   13. Did rapid transportation in commerce have anything to do with the entry of the United States in the World War?
   14. Did it have anything to do with our winning the war?
   15. Transatlantic and transcontinental trips of aëroplanes.

The pupils have enjoyed the work. At no time did interest seem to lag. I feel that the purpose of both teacher and pupil has in the majority of cases been accomplished.

Transportation was an opportune subject at this time.

Magazines and newspapers contained valuable articles both as to past, present, and future modes of travel.

This project may be used to correlate the work in geography and history.

Does the United States Produce Enough Sugar to Supply Her Own Needs?[1]

Teacher's Aim: To have the pupil realize in a larger way what commercial and social relations of people are necessary for the good of the individual, and to have him see how man's life is affected by geographic controls, such as climate, soil, and rainfall; also to help the pupil to become more independent in his thinking, to have more initiative, and specifically to lead him to develop an interest in the production of the common necessities of life.

Pupils' Aim: (1) To find out whether the United States produces enough sugar for its own needs; (2) to make the sugar booklets and sugar exhibit.

Method of Procedure: The sugar project was introduced by an informal talk on sweets relative to their popularity and the extent to which they are used, during which arose the question, "Does the United States produce enough sugar to supply her own needs?" This question, coming at the close of our talk in which we also discussed the scarcity of sugar during the war, was of great interest to the pupils and became the

[1] A project developed by Clara E. Kanger, teacher of the fifth grade, Kent School, Rockford, Illinois.

basis for research work leading to a desire to know where sugar cane grows and how much of the United States is available for producing this plant.

They found that Louisiana is the chief sugar producing state, and the question naturally arose, "Why does Louisiana produce most sugar cane?" Thus, with the teacher's aid and the use of maps and reference books, the pupils worked out the fact that Louisiana has been especially benefited by the Mississippi River as to soil; that this river has actually taken rich soil of other states and carried it down to Louisiana, and that this advantage, together with the warm climate and abundant rainfall, makes this state especially fitted for the successful growing of sugar cane.

In the course of this work, the pupils learned to use the indexes of their own geographies, and to avail themselves of many sources of information other than the textbook. In developing the fact that the Mississippi River is responsible for Louisiana's rich soil, they learned incidentally how rivers and valleys are formed and how running water is forever tearing down and leveling the land, leaving the poorer soil on the hills and the rich soil in the valleys. The next step, viz., finding out how sugar cane is raised, naturally grew out of this discussion, which closed with the process of manufacture and the location of the refineries. At this point, the question came up, "Why are so many sugar refineries located in the New England

States?" This called for consideration of the Southern life of past years, and, especially, of the topic of slavery.

But we had not yet settled the question of the United States' ability to supply her own needs. Every day, new and interesting facts were brought up by various pupils; some soon discovered that a large amount of our sugar is made from beets, others discovered that there are other kinds of sugar, such as maple and grape. We were especially fortunate in having in our class a boy who had lived in Louisiana, and, in spite of the fact that the class ascertained that we produce both beet and cane sugar in large quantities, he asserted that he saw shiploads of raw sugar from Cuba and Porto Rico come into New Orleans very frequently. This naturally led to an interest in Cuba and Porto Rico. These islands were located on the map, and their history discussed, thus leading to the story of Columbus and ending with the Spanish American War. Through the story of the latter event, the Philippine Islands became a subject of interest, and the fact was discovered that these islands, too, produce much sugar. In connection with this work our interests, of course, included the habits and customs of people inhabiting these islands. Through this work in connection with the Philippine Islands we learned at least one reason for the location of sugar refineries at San Francisco. Finally, one boy found a reference that stated conclusively how much of our

sugar we are able to produce ourselves and how much is imported. By means of a sugar-cane map the pupils found that other countries with climate and soil similar to those of Louisiana also produce sugar cane. In this connection we found out that cane sugar originated in India.

At the very beginning of our work, the pupils found interesting pictures, some of which they cut from discarded books and magazines and eagerly showed to the class. By the way, pictures furnished a constant and most interesting source of information for our work — hence, we decided to make a sugar-booklet, using our English periods for writing up interesting things that had been discussed in the preceding geography class. We also decided to write to various companies listed under "Material on Geography," in the *Normal School Bulletin*, published by the Eastern Illinois State Normal School at Charleston. These companies supply literature and exhibits on geographical topics either free or at very small cost. Hence, each one chose a company to write to, and then, of course, we found it necessary to develop the writing of a good business letter. When, in due time, the replies came in the form of attractive booklets containing interesting pictures and literature often accompanied by a real business letter from the company itself, the pupils' faces invariably beamed with pleasure, and each one, without exception, asked permission to take his reply home to show to his parents.

To make our booklets complete, we decided to include items concerning other kinds of sugar, also. We studied the subject of beet sugar in detail; the climate and soil best suited to the growth of sugar beets; the history of sugar beet culture, which took us to France and touched upon European life and the recent war; the method of raising beets and the process of making sugar from them. Comparisons were made throughout with sugar cane.

We took up maple sugar in a similar manner. The pupils were surprised to learn that the Indians were the discoverers of this kind of sugar. This information was gained from the free literature which they had received in reply to their letters. During the English period, the children not only wrote accounts of interesting things discussed during the geography period, but mounted pictures relating to the subject, and even made drawings if no other illustrations were available. They also made maps showing where the various kinds of sugar were produced. Their books also contained something about honey, which they found was the first sweet substance known. Interesting articles cut from magazines, including those on ways and means of saving sugar, were mounted and added to their collections of material for their booklets. We also discussed and wrote an account of the causes of our sugar shortage during the war. Finally, we worked out an outline showing the order in which the stories of sugar ought to be bound, an index was made, and the pages of the

booklets placed within covers which had been designed and made during drawing periods. We concluded our work by making a sugar exhibit consisting of several small bottles filled each with a different kind of sugar and mounted on a piece of cardboard with a note of explanation under each. The contents of the bottles, with one or two exceptions, were provided by pupils of the class, and they selected a committee of two to attend to the work of mounting the bottles.

During the entire period of time spent on the subject of sugar the children showed a high degree of interest. Especially was this evident during the class periods; for at this time problems arose and were solved, and free, courteous discussion was allowed among the children on all questions that arose relative to the subject. The pupils were allowed to use their reference books at any time during the recitation periods, if necessary, in order to answer a question or solve some problem that came up in the course of their discussion. Arithmetical problems in connection with the subject appeared from time to time, and thus arithmetic was correlated with geography. Their books, though crude and unfinished in some respects, are, nevertheless, treasured possessions, while the exhibit was used to advantage in another grade.

The study of the sugar industry may be introduced in many other ways, such as through a candy sale for the purpose of raising money for a room or for the entire school. Also, added interest in the subject may be

secured by actually collecting maple sap and boiling it until it becomes sugar. The making of a book of choice cake, pudding, and candy recipes might be another way of approach, and, in this way, the interest of the children might be aroused in making wholesome candies instead of buying the cheap varieties of questionable quality. The planting of sorghum or sugar beets in the home or school gardens might also prove interesting. The important thing, of course, is that the child shall have a real purpose to carry out, — a purpose which is really his and not merely the echo of some other person's idea.

The author considers this project interesting because situations were developed in carrying this unit of work to completion which involved geography, arithmetic, history, writing, art, and hand work.

Projects in History

Why the United States Declared War on Germany. — A class in current events was discussing the war as a contest between autocracy and democracy. Granting the oppressiveness and brutality of the German autocracy, one boy would not see that the United States was justified in going to war to oppose it. The boy was obviously ignorant of many of the other reasons for our entry into the war. He had been on his father's ranch since the declaration of war, and had not read the newspapers. He had no German connections, or sympathies.

His project was the task of finding out just why we declared war on Germany. His instructions merely said that he should consult three sources of information, each a different kind of source.

His report to the class a week later was illuminating to others besides himself. An uncle had given him the purely moral grounds for our entry — the assault on Belgium, the outrages in northern France, the barbarity of the aërial warfare, and the inhumanity of the submarine campaign.

A bulletin of the Committee on Public Information had furnished him with a review of the evidence that Germany started the war for imperialistic reasons, and this fact, together with the character of the German warfare, had convinced him that the ultimate safety of the United States demanded Germany's defeat. Several newspaper writers had expressed the opinion that the collapse of Russia insured a German victory unless our aid should become quickly effective.

These considerations appealed to him strongly, but he was even more surprised by the record of submarine sinkings involving the death of Americans. A copy of the *Review of Reviews* had published a complete list of all the vessels so sunk, together with the diplomatic action taken by the United States in each case.

These grounds he regarded as more than sufficient reason for our entering the war without considering it as a struggle between autocracy and democracy.

What Progress Has Been Made in the World War over the Civil War?[1] — After the preliminary discussion which led to the choice of this problem for study, several lessons were given to a consideration of how the material could best be organized for comparison. A list of topics was prepared which formed the basis for study and for the assignments to the members of the class. Following is the list of topics:

I. Preparations.
II. Drafting of armies.
III. Equipment; guns; supplies.
IV. Financing.
V. Camps and training.
VI. Transportation of troops.
VII. Navy.
VIII. Battlefields; trenches; maps.
IX. Red Cross; Sanitary Commission.
X. Directing of battle lines.
XI. Generals; comparison of commanders.
XII. Battles — land, sea; blockades.
XIII. Morale.
XIV. Destruction — land, property, troops.
XV. Objectives taken; forts; effect upon countries.
XVI. Surrender.
XVII. Demobilizing — at home; abroad.
XVIII. Peace Treaty.
XIX. Songs — patriotic, 1860; cheers, 1918; bands, 1918; drum corps, 1860; poems, 1860; poems, 1918.

[1] A project reported by Mrs. Haupt, teacher of the eighth grade, Kishwaukee School, Rockford, Illinois.

The next step was to help each one to work up his topic by making use of the public library. The teacher spent some time at the library finding sources of information relating to the Civil War. The class then went to the library to begin the reading.

The librarian was furnished with the name of each child and his topic. She had looked up references and placed the material in a convenient place for the pupils. After working for one and a half hours, books were selected that could be taken home for more work. While this was not an ideal method because it left little initiative to the children, it seemed expedient and enabled the class to carry through a profitable study which could not have been accomplished otherwise. The class later had instruction in using the card catalogue and in looking up references.

The next class period was spent in discussing the benefit of the afternoon's study. Difficulties were discussed and methods of overcoming them were proposed. At this point the pupils wished to begin to discuss their topics. It seemed wise for each to make an outline of his subject before presenting it.

Topics were presented in the class in the order of the general outline. A general discussion followed each talk and opportunity was given for the asking of questions, for the giving of information, and for the challenging of any point. After the discussion of the topic "Financing the War," a number of problems in arithmetic arose and were solved. The location of camps,

forts, and cantonments gave practice in geography. It was interesting to note how many took their names from Civil War leaders.

Besides the knowledge gained about both wars, the following good results were noticeable: undiminished interest throughout the work; unfailing enthusiasm; advance in ability to prepare work independently; more knowledge of using the library; gain in power to present a topic orally before the class.

Projects in Manual Training

A Large Project in Manual Training. — The large project herein described was carried out in the public schools of Clifton, Illinois, during the year 1911–1912, under the direction of Principal Charles Trimble, and duplicated in part in the Ashkum, Illinois, schools during the year 1912–1913. The description of the project is practically a description of the whole plan of manual training in the Clifton schools.

There was a desire on the part of the school board, parents, and pupils of the school for a course in manual training. This same desire may be found in the average small school system. There was no definite purpose on the part of the people, except that other schools had such courses, therefore, in all probability, Clifton should have one. The school course was the traditional eight-year course with three years of high school work. The principal organized the course of study and supervised its administration. The school board, while sym-

pathizing with the plan of introducing manual training, did not feel that they should spend the money necessary to install elaborate equipment. They agreed, therefore, to furnish the material needed for remodeling and making the work benches if the boys would do the rest. The principal was a practical man, a carpenter and builder, and worked at his trade during the summer months as well as at odd times during the school year.

In the beginning, Mr. Trimble determined upon certain aims. These he found in the lives and activities of the children. By conversation with the boys he discovered what they wanted to make and what use they intended to make of the products. Among these were a window seat, a study table, and a playhouse for the children. Each boy had some definite thing in mind which he wished to make. The boys or their parents assumed the responsibility of getting the tools and materials necessary.

The school building was of the regulation grade-school type. In the basement, however, was a storeroom in which a considerable amount of useless material had accumulated. This room the boys decided to make their shop. It was unfinished in that it lacked a floor and adequate light. The floor, they decided, should be cement (Mr. Trimble admitted afterwards that this was a mistake) and the windows had to be cut out so that full-sized frames could be installed. "At first," Mr. Trimble said, "the boys worked for me like

apprentices." In the matter of constructing the floor, however, some investigation was necessary. They looked up all the information that they could find about cement in the school library, but this proved inadequate. They therefore went to the trade journals and the literature of the cement companies, with the result that they learned the story of cement from the time it is mined to the time it is in use in the walk or floor. They learned especially the kinds of foundations used, the proportions used in mixing, the methods of mixing, the means of applying, and the precautions to be taken. "It was very important," said Mr. Trimble, "that no mistakes be made. A bad job not only detracts from the interest in the work but is a continual nuisance." When all was carefully planned the boys bought the cement, conveyed it to the schoolhouse, and did the job. As a direct result of this achievement one of the boys bought material, mixed it, and laid a walk at home.

The next problem was the benches, saw-horses, and miter boxes. For these the school board furnished the lumber, but all the work was done by the boys.

"In most of the school workshops," said Mr. Trimble, "there is a bench for every boy. These are equipped with lock vises, patented stops, and plugs. We did not see that this was necessary, for, when one boy was working at the bench, others could work at the 'horses.' Besides no practical carpenter uses that sort of thing."

Accordingly, one large bench, which extended nearly the whole length of the room, and two smaller benches were made. These were equipped with vises which the boys made and which operated by means of the old-style bench screw. The work was carefully planned under the supervision of the teacher so that the material could be sawed and shaped to fit before assembling. There was very little waste in material. In the same way, tool boxes were made to fit the tools that the boys had or might expect to use. The boys bought their tools or carried them from home. A very few special tools were supplied by the school board.

All the work that has been done in this shop has been done by the project method. Mr. Trimble first makes sure that the boy knows what he wants to make and that he has some use for it. The boy must then submit a working drawing that is "readable" and the dimensions must "prove out." Very little limitation is placed on the projects attempted except that the product must be useful. The boys are allowed to make those things which they or their parents would be likely to buy. A few projects have been worked out as drill exercises.

When a boy is "graduated" from this course he takes his tool box and tools home with him for his future home projects.

Manual training is not required of any of the pupils, but most of the boys and some girls take it. The girls have a similar course in sewing given by a teacher

who, during the summer months, is a seamstress, dressmaker, and milliner.

Making and Furnishing a Dolls' House.[1] — When a child begins school he is not severing home ties, but he is taking his first step in the outside world. Home, and all that it means, is still his main thought, so, in choosing a dolls' house as a project for a class of beginners, I took something that I was sure would interest all, and at the same time bridge the gap between home and school. I could add to the information of the children by discussing with them during the process of building the source and use of the materials which we handled, and the need and meaning of these things in our daily life, thus opening the subject of the relation between home and community life.

Through our talks leading up to the adoption of the project, the children's aim came to be the building and furnishing of a home for their dolls to live in.

"What do you like to play with at home after school, children?" The answers to this question were many and various. Some of the boys liked to play with their sleds (for it was winter then), others, to roll small snowballs into larger ones. One little girl said she liked to play house with her doll and her dishes. It was then that I learned the history of every doll family which my little group of girls possessed. I asked

[1] A project reported by Elsie M. Ford, a teacher of the first grade, Kent School, Rockford, Illinois.

if their doll families had real dolls' houses to live in. No, they didn't seem to have any, so I asked, "How would the little boys and girls like to make a real house for the dolls to live in?" Questions such as, "Can we sit in it when it is done?" and, "Will it have a real roof and windows?" arose, and every one seemed eager to begin right away.

"What do you suppose we could make our dolls' house out of? What material is used in making houses?" Through previous talks on the source and use of lumber, the children were able to answer "lumber," and so it was decided to have a frame house. A large box found in the school building furnished the body, but, as one pupil said, "It doesn't look like a house; there isn't a roof nor any windows." "Would you like to put a real shingle roof on it?" Oh, yes, they thought they would.

Roof boards cut in the right proportion were secured, and, after placing the box close to a table so that little hands could easily reach, with a little aid the roof rafters and roof boards were nailed on. The children were then shown how to lay shingles and no house has been shingled with greater joy in the work than our dolls' house. While shingling we talked about the carpenter, the origin of shingles and shingle nails, and all that had to be done before the shingle and shingle nails were ready for use. After the house was shingled, the ridge board was nailed into place and painted, and the gable painted.

"Is there anything else to do to this house before we move in?" "Oh, Miss Ford, the windows aren't in yet!" A gimlet was secured and many small hands took great delight in turning it, and gleaming eyes watched the auger as it went through the wood. The pastime, then, was counting the holes. Each window had four holes and, if any child made a mistake in counting, it was quickly noticed and corrected by others. Running the keyhole saw was too difficult a process for the little people, but shouts of real joy greeted each piece of wood as it fell and the window came into view. The pieces of wood cut out were counted, the windows were counted, the girls and boys working were counted.

"Now, let us move in, children." "We haven't any chairs or tables." "Can't we make some?" "What shall we make them out of so that they will be like real chairs?" "Wood! Lumber!" Lumber it shall be. Thanks to the foresight of our primary supervisor we had the lumber on hand, also hammers and nails. A few lessons were given in fitting different pieces together to see what could be made (the parts for the different pieces of furniture having been selected and placed in piles). Every one made something and, as each piece was made, its name and use were talked about. I asked the children if the furniture in their homes was the color of that which we had made. No one seemed to think so. "Why isn't it?" I asked. Through previous talks on painting houses and wood

to preserve and beautify, they knew that it was because the furniture needed to be painted. Right here, the director of all this fun purchased a can of stain for its quickly drying and non-sticking qualities, and interest surely ran high while the staining was in process. Every one painted something. One little boy wanted to know if he couldn't make and stain a "grandfather's clock." The pieces suitable for it were given him and a clock was the result. A little girl cut a white circle and an orange pendulum and we had a good-looking clock.

"Children, do the houses you live in stand right on the ground?" No one seemed to have a clear idea, so a walk was indulged in, and we came back with the idea that our house ought to have a foundation. We found that the janitor could furnish us with enough brick for the purpose, so several boys brought them to the scene of action and our house soon rested on a brick foundation. Our house now had a roof to keep the rain from coming in, and a foundation to keep the floor dry and warm.

In the meantime, real cloth rugs had been in the process of construction on little looms, and by the time the furniture was ready for the house, enough rugs were ready also. A pink rug with gray border was chosen for the bedroom, and the bed, dresser, chair, and clothes rack were placed by eager hands. A blue rug with a white border was decided on for the sitting room, and the bookcase, davenport, library table,

and chairs were arranged by the children. A dark blue rug with a white border was placed on the dining-room floor and the round dining-room table was carried into the house, four dining chairs placed around it, and the buffet placed close by. Our kitchen furniture consisted of a cupboard, kitchen table, and chair; and these were soon in place. Brass tacks furnished the handles for the cupboard, sideboard, and dresser, and the two latter were decorated with real mirrors.

"Children, what is the matter with our windows?" Answers quickly came, "There is no glass," and "No shades to pull down," and "No white curtains!" Interest ran high again at the prospect of getting the windows to look like those at home. What color should the shades be? Many colors were suggested but green was decided upon, and oblongs of green paper were cut and held in place at the windows by push tacks.

One day, later on, found the little girls grouped around the dolls' house, weaving needles and thread across the tops of pieces of white cloth. Having had previous experience in weaving, this was a light task and the curtains for our windows were soon finished.

We talked about the cotton seed that helped make the cloth used in our curtains.

Pictures, brought by the children, were placed on the walls of our house by them, and our dream of having a dolls' house had finally come true.

Projects in Mathematics

What Problems Are Involved in the Widening of Church Street?[1]

Teacher's Aim: To give a thorough review of arithmetic. To interest the children and, through the children, the parents in the Rockford Plan.

We began this work by reading and discussing articles from the Rockford Plan Book. We read very thoroughly the suggestions on widening Church Street and talked about the reasons for the extension of the business district to this street. I told the class about the necessary change from seventeen feet on each side of the street, as first planned, to sixteen feet on each side. The class located the Cook Building which was involved.

We read the names of the special committee appointed by the Rockford Chamber of Commerce for investigating a city plan. I asked the class to talk with any member of the committee and report to class all the information they received. A committee of three called on Mr. George D. Roper and received much valuable information.

With this information added to what we gained through reading the Rockford Plan we began to work out our problems. We drew a line sixteen feet long on the board and the class learned to estimate a distance

[1] A project reported by Alice Nolan, teacher of the eighth grade, Blake School, Rockford, Illinois.

of sixteen feet. Then the class made a careful study of Church Street. They found that it would be necessary to reconstruct fifty-two buildings on Church Street between Cedar Street and Peach Street in order to widen the street sixteen feet on each side. We found one building that would be only six feet wide after the necessary change and, after some discussion, decided the city would have to buy this property.

Mr. Roper told the committee two ways were being considered for raising the money needed for widening Church Street. One way for raising the money was by taxes, the other by bonding the city.

We studied the first way suggested, by taxes. The following questions were given to the class:

1. What are taxes?
2. What do you mean by assessed valuation?
3. What was the 1918 rate of taxation for the city of Rockford?

After answering the above questions, the children brought the amounts of personal and real estate taxes paid by their parents to class and we made those the basis of our problems. The Winnebago County road tax was very much discussed in the local papers at this time and furnished material for many problems. The income tax collectors were in our city at this time but I found that very few of the pupils heard this subject discussed at home and only two pupils knew their parents paid an income tax. We made a thorough

study of the income tax, hoping all the pupils would have future use for it — a tendency to social service. Following this, we took the principal problems on taxes given in our textbook.

After completing the work on taxes, we studied the second method suggested, — bonding the city. We spent a short time on government bonds, — the Liberty Loan and the Victory Loan with which the class were familiar. We followed this with a study of city bonds, then discussed bonding the city for the improving of Church Street. We found this to be an impossibility as it would have to be voted on at a regular election or a special election and as our city can only be bonded for $400,000 it would not cover the expense.

We then made a study of the salable property on Church Street. Teacher's purpose: — To enable the child to study and understand investments for present and future use. Through those investments, to review interest, mortgages, bank discount, insurance, partial payments, and to study the local Building and Loan Associations.

On Church Street between State and Peach, the pupils found no property for sale. On South Church Street they found that, in the second block on South Church Street, the Lewis lot, 29½ feet by 100 feet, was for sale. Price $9000. Mr. Lewis told the committee that he had paid $3600 for it and that if the street were improved he would ask a higher price. We decided not to invest in this lot.

In the third block on South Church Street we found a seventeen-room house for sale. In the fourth block, we found two places for sale, one residence for $8000, but the owner would not sell if the street was to be improved. We gave this place no further consideration. The other place in this block was on the market for $15,000, but to us, at the present time, undesirable.

Upon further consideration we thought the seventeen-room house might be a good investment. At present it rents for fifty dollars a month and is used for a rooming house. After deducting taxes, insurance, and making allowance for repairs, we found fifty dollars a month a very poor income from $15,000.

We decided to buy this property, making a cash payment of $5000 and the remainder in monthly payments of $100. The rate of interest was 6 per cent. Here we made a study of contracts, mortgages, and Building and Loan Associations. The class found that we had two such associations in Rockford and a committee from the class called on each and studied its business methods.

The class found that, if this property were bought, the purchaser would have to assume the responsibility of the taxes and insurance. A member of the class brought in insurance literature which was studied by the class. Both fire and life insurance policies were brought to class and investigated. In connection with life insurance, we studied "old-line" accident and life insurance.

The definite outcome of this project was shown on the pupil's papers. The summary of one is given here:

Result of House Problem

$15,000 — Price asked for the house.
$5,000 — Cash payment.
$100 — Monthly payments.
6% — Rate of interest.

(Problem was fully worked out in partial payments. Following is summary.)

$13,800.00	— Amount paid in 138 months — $100 payment monthly.
97.63	— Balance due the 139th month.
$13,897.63	
5,000.00	
$18,897.63	— Total amount paid.
15,000.00	
$3,897.63	— Interest paid.

We found that it would take 11 years and 7 months to pay for the house, during which time we would have to pay the taxes, insurance, and repairs, therefore we concluded that the transaction would be a poor investment.

A Project in Solid Geometry. — The following project was used in a class in solid geometry composed of twelve boys. The class had been studying mensuration and volumes, when the instructor happened to hear of the possible project. At the home of one of the members of the class the construction of a driveway was contemplated. The information desired was: Which side of the house would be the better place for it, and, then, how much excavation and how much material would

be required for its construction? The class was given the project and given two days to work out the solution. The result proved to be accurate and satisfactory in every particular.

A Project in Solid Geometry, Physics, and Manual Training. — Another project used in this class cut across three subjects. The boys needed a number of shots for spring athletics. It was found that a local foundry would cast them for a mere fraction of the cost at which they could be procured at a sporting goods house. However, the foundry needed a model. The physics class was appealed to for information as to the mass and volume of the iron in order that the shot should be of correct weight. The teacher reported an unprecedented interest in the rather dry subject of density and specific gravity. The solid geometry class was consulted as to the method of finding the volume of a sphere, and when the data were complete, they were taken to the woodworking room of the manual training department, where the spherical model was made. When the shots were delivered from the foundry, it was proved that the classes had done very accurate work as the shots varied less than a quarter pound from the necessary weight.

A Project in Arithmetic in the Grades. — The purpose of this project was to learn to determine the amount of wall-paper needed for the rooms in the children's homes and to determine the validity of the paper hanger's account.

There is always more or less paper-hanging done in every school district. The teacher may presuppose that this will take place every spring and plan for the occasion by finding out, among the pupils, which families are going to do papering. Interest may be aroused by asking the children if they do not wish to be of help to their parents by measuring the rooms and figuring the amount of paper necessary and by this method save the parents' money and time. It is a fact that many paper hangers waste paper and charge the customer for more material and labor than is necessary. Paper hangers are paid by the bolt as well as for the paper. The more bolts cut, the greater the profit. This situation offers a good chance to interest the pupils in papering problems.

A Project in Biology

Relation of Wheat Rust to Barberry. — During the spring of 1918, when our government was doing its utmost to conserve wheat, the botany classes of the Urbana (Illinois) High School (three classes with a total of sixty students) carried on a project which had as its aim a lessening of the enormous loss of wheat due to wheat rust.

We proceeded as follows:

1. We made a laboratory study of the life history of wheat rust (*Puccinia graminis*), during which we found that the early spring spores of wheat rust *must* be parasitic on the common barberry (*Berberis vul-*

garis) if they are to germinate; consequently the extermination of the common barberry in Illinois would mean the extermination of wheat rust.

2. We brought into the schoolroom as many newspaper and current magazine articles as we could find concerning the relation between wheat rust and the barberry. One member of the class, who had a friend in the government service as an investigator of wheat rust, had some original information to give us.

3. We made an examination of the shrubs in our school yard, and found *seven* of the dangerous barberry plants right at our very door. These we examined very carefully so that we might be certain of their identity. Then with great ceremony we dug them up; for several of the girls had written poems entitled "Ode to the Death of the Barberry" to be read on this occasion. The best "Ode" was printed in the school newspaper.

4. About seventy-five per cent of the class volunteered for the real work, and these students were organized in teams of two. A committee elected by the students secured a map of the town, and assigned each team a given part of the town to be inspected, in such a way that not a dooryard or a lawn was omitted by the student inspectors. Even the city park did not escape.

5. Wherever common barberry plants were found, the students explained to the property owners how these shrubs were lessening our supply of wheat, and

suggested their removal. The students made their records on cards, in each case telling whether the property owner promised or refused removal of the shrubs.

6. Reports of all the students were tabulated by a committee, — the tabulated report showing (*a*) the number of barberry plants in the city; (*b*) the number of property owners possessing these shrubs; (*c*) the number of property owners who promised to remove the shrubs; (*d*) the number who refused. This final report was printed in the city's daily paper.

7. When a rumor reached us that some one in the City Council was to propose an ordinance providing for the eradication of the barberry, we sent a representative to the city council's meeting, with the exact data concerning barberry plants in the city. Unfortunately the council passed the ordinance without discussion, and there was no need of the boy's data.

Since the extermination of barberry now became the duty of the city police force and not of the high-school botany classes, our project had now reached its end.

Results. — 1. Even the poorest student knew the life history of wheat rust, and its relation to barberry.

2. Very great class interest. Before we were through canvassing the town, a wealthy citizen telephoned to the school for two "experts" to examine his shrubs for barberry. Imagine how important our boy "experts" felt!

3. A large number of barberry plants were actually removed, and we thus helped our government to conserve the wheat.

May I add that this project took only about a week of class time, for the students wanted to work outside.

Projects in Home Economics

A Remodeling Project. — The project is to make over a girl's room so that it shall be artistically satisfying, mentally stimulating, and mechanically convenient.

Method of Procedure. — Each girl shall determine the meaning and purpose of the house and the home and what they signify. Furnish reading and discuss it with her. Give sufficient time for clarifying ideas. A notebook shall record the various phases of the project.

The students should be given the opportunity to discover some principles in art as applied to a room. For example: why not place rugs diagonally; why not hang pictures by a wire and one nail; why is one design good; another bad; etc. Observations shall be made to clarify the problems. Readings and discussions shall lead to their solution.

Each pupil shall make a drawing of the room, giving dimensions, locating position of furniture, windows, and doors, and indicating exposure of room, and means of heating. The furniture and articles in the room shall be described in detail.

Each pupil shall make a plan for the proposed

changes. A generous supply of illustrations shall be available for the study. Plans shall include reasons for any change proposed, involving whatever principles of art the pupil may have learned or developed. Other principles will be developed as the project proceeds.

Changes may include:

1. Cleaning of wall paper or, perhaps, repapering.

2. Remodeling and refinishing of furniture. New furniture is not included in the scheme.

3. Remodeling and rehanging of draperies or curtains.

4. Selection and hanging of pictures.

5. Re-placing of furniture.

6. Floor covering.

7. Whatever small buying may be agreed upon.

8. Mending of door latches, hooks and hangers, knobs on dressers, etc.

9. Device for ventilation.

The pupil shall write out in detail changes proposed. These shall be discussed and any changes that seem desirable may be talked over and agreed upon. If any radical change is proposed in the color scheme, it shall be illustrated by a sample.

When finished, the results shall be checked up, the principles reviewed, and the notebook completed.

Time for the project, three to five months.

A Project in Dietetics. — The object of the following project was to determine how much food a person should eat each day. We took into consideration

our occupations and the average weight of the class. We were then told to figure out a day's menu on this scale. Using this menu, we prepared and ate three meals in the domestic science department on one day. These meals furnished all the food that we ate that day. In this way we were impressed with the fact that ordinarily a person eats too much, and not a sufficiently varied diet. We took much more interest in the problem of preparing our menu, knowing that we should have to eat what we planned, than we would have taken in planning some representative menu only to be recorded in our notebooks. The facts taught by this project made more emphatic in our minds the actual doing of the thing planned.

A Project in Cooking. — In one of the domestic science classes of a southern school, a plan was formulated to serve cheap but nutritious lunches. The girls planned their meals so as to use as many as possible of the substitutes advocated by the United States Food Administration. They obtained much valuable experience in practical cooking which they were able to use in their own homes. The school has been able, through its lunch department, to pay a portion of the expenses of the domestic science department.

Projects in Physics

A Project in Ventilation. — Ventilation: Why and How Do It? Guide questions and problems for planning and working out the project:

1. What are the respective lengths of time a person can live without food, without water, and without air?

2. Which have you considered most important and why?

3. Is it likely that lack of ventilation has been and is the cause of physical imperfections and social inefficiency? Ventilation plays an important part in the treatment of what infectious disease?

4. How does a knowledge and understanding of the question offer an opportunity for performing a social service?

5. What is the attitude of the industrial world toward ventilation?

6. What are the requirements for the air we breathe? Examine the floors and furniture in houses and reflect upon the composition of the body and effect of air upon it.

7. What changes in the ventilation of our houses does this suggest, and how could they be accomplished?

8. Suggest ways for humidifying the air: in homes; in public buildings.

9. List the number of churches, schools, town halls, stores, houses, in which there is some device for humidifying the air.

10. What plan will suit your home?

11. What other quality must air possess in order to make it comfortable and healthful?

12. What relation do these requirements bear to each other?

13. What are the methods for *warming* not *heating* the air, and how do they influence ventilation?

14. Is there still another requirement for the air we breathe?

15. It is no longer believed that ventilation is wholly an engineer's problem. That being the case, upon whom are we now depending? How do you explain this changed attitude?

Refer to physiology, physics, and chemistry and help discover that now we turn from chemistry to physics — from the lungs to the skin. Heat which the body *must* get rid of is carried away through the skin by conduction, convection, evaporation. These processes are hindered or promoted by air surrounding our bodies. Observe and ask for explanations of humid days, "dry" days, cold and warm days. Recall people sleeping in church; children in school; sunstroke.

16. What is the purpose of the electric fan?

17. What are the methods in use for ventilating houses? Public buildings?

18. Upon what principle do the devices used in residences operate? In large public buildings?

19. What objections to the method used in residences? How overcome them?

20. Have student attend to ventilation of schoolroom, or inspect the system and offer suggestions if not found satisfactory to him.

21. What plan has student devised for his own

room? The barn where animals are kept if he has one?

22. What interest have we in the ventilation of the stables for cows? Chance here for work on improvement of milk supply.

23. Cost of ventilation. Does it pay?

Very excellent material is now published on the subject of ventilation. I should make it available to the student. It is my opinion that the student will inspect and finally devise a plan of ventilation to meet the needs of his home.

The Automobile. — The automobile furnishes excellent illustrations for most of the principles in physics. In one of the large city high schools the automobile was made the unit or basis of the practical work in physics. It was surprising how few principles in physics could not be illustrated in this way. If the principles developed and illustrated in this project are later arranged in a logical order and reviewed, probably with additional illustrations, the method will produce satisfactory results. The systematic drill is very important and must not be slighted.

The Fireless Cooker. — The study of the principles of the fireless cooker and the construction of one for the home makes a good project. This project will involve the study of the conductivity of different liquids, solids, and gases and the different means by which heat is transferred.

Projects in Foreign Languages

A Project in German. — This project was tried the first year that German had been introduced as a subject in the course. The class consisted of freshmen and sophomores. We had discarded the direct method of teaching German only because of inability to secure a teacher who could handle the language fluently. Conversational exercises had, however, been a part of each recitation and the class did considerable reading. It was proposed to have a German party and dinner at which only German should be spoken.

Arrangements for the party included a study of the common articles of food characteristically German. These comprised the menu of the dinner. Habits of dress and conduct of the various German classes were studied in so far as possible and these were represented in costume and conversation. The rules of the game were that no word was to be spoken save in German. No attention was to be paid at the table to any one asking for a dish unless the request was in correct German, nor should the dishes be passed without this request. The "toasts" were prepared and given in German.

The preparation on the part of the students consisted in the study of the menu and appropriate table manners, the preparation of the "toasts," and the working out of a vocabulary for certain topics of conversation.

As an incentive and model, some students not in the German class but who spoke German in their homes were invited.

This could not be called a true project for the setting was entirely artificial. The exercise served admirably to motivate the work and seemed worth while from the standpoint of acquiring a vocabulary.

A Project in French. — Many of our soldiers learned French by the project method. They were placed in situations which demanded a knowledge of the language. The desire to make purchases and to converse with the French people acted as a powerful stimulus to acquire a speaking vocabulary. If our French classes could correspond with students in France, the scheme would approach the project method.

Projects Cutting across Several Fields of Subject Matter

Construction and Furnishing of a Bungalow Cottage.[1] — The teacher's purpose was to furnish a live problem which would carry a review of arithmetic, the various operations, and their application in measurements and costs. The working out of the problem revealed several advantages of the project method over the "study-recite" method. It furnished a motive which sent each pupil out to seek material and information wherever he could secure it. The problems involved

[1] A project reported by Minnie Murtfelt, teacher of the seventh grade, Kishwaukee School, Rockford, Illinois.

were more easily taught and more easily understood because they were more interesting than the ones in the book. A greater amount of work was successfully covered in a given time. The girls and boys gained the power to image the problem; they pictured every step in the building of the bungalow as far as we were able to go.

Having decided in my own mind that this would be of vital interest to the pupils, I led up to the plan by a few questions. Before many minutes the girls and boys were entering into the discussion with questions and ideas that came to their minds: "My father is a contractor and I can find out about houses"; "My father builds houses and I can bring some plans." The next step was to decide what size the house should be, what its position should be, and about what it should cost. Here the children took the initiative and went out and investigated for themselves. They found that a modern bungalow cottage would cost from $4500 to $5000. They brought in books, magazines, blue prints. They went to the public library and found books containing plans. After carefully examining the various plans, I asked each child to draw the plan of a house such as he would like to live in. These plans were discussed and the good and bad points pointed out. The best one, with perhaps a few changes, was put on the blackboard, and all drew accurately to a scale of ¼″ to 1′. This gave them excellent drill in ratio and proportion. Now we were

ready to lay off our lot and place the corners for the house. We did this on the school grounds with the use of the carpenter's measuring line. I wanted them to have the real size in mind, so we used exact measures, the lot 50 ft. × 120 ft., and the house 28 ft. × 38 ft.; the house to be 20 ft. from the street and to be on a line with the other houses in the block.

In connection with the class work, I decided, if it could be arranged, to have a real house built, but did not see at first just how it was to be accomplished. When I spoke of it, one boy said, "My father will build us a small house." Still that would not be so good as to have the boys build it themselves. Finally, our manual training teacher aided us in bringing about the desired result. The work has been of vital interest to the children because, as one boy put it, "We are doing a man's job."

It became evident that not only the children were interested but the parents as well. One mother came over to see me before school to bring some material and to tell me how much her boy talked about the real house. Several of the parents have come to see the building in progress and have thought the work practical and the problems more suitable than so many that are given in the books. One parent, who is a foreman in one of the factories, furnished a good part of the lumber.

Below are given some of the problems that we have been working. All the children have worked all

the problems, some by short cuts, as the carpenter would work them. Problems originating in the shop room were brought upstairs. The boys were called upon to explain the various phases of the work, the test of their explanations being how well the girls understood. All problems were solved with the house before us in the classroom. One boy's question, "How are we going to pay for this house?" led to several visits to banks, the procuring of blank forms and information, and a motivated review of bank accounts, borrowing, and various phases of interest.

When the building part is completed, the girls will have the big job of furnishing the house and I hope to have them do it in connection with the domestic science work next year, bringing their problems to the boys.

Problems

I. Corners of lot 40′×120′ laid off on school grounds.
Corners for house 38′×28′ placed on lot.
House to face the east and 20′ from the street.

II. Plan of house decided upon and drawn accurately to the scale of ¼″ to 1′.

III. Basement to have furnace room, laundry room, and room for fruit and vegetables.
Main floor of six rooms and bath.
Attic to have two large rooms.
Foundation of concrete with brick 30″ above ground.

IV. Construction of foundation.
Use soft pine ¾″ thick and 7″ wide for concrete and brick, painting upper 30″ a brownish red for brick imitation.

Make wall 28″×38″ exact outside measure and 7″ high.

Cut window openings 3″×2½″ and put in window frames of ⅛″ material.

Put in cross walls 7″ high of ¾″ pine for concrete; one under partition between living room and dining room; one under partition between front chamber and bath; and one under partition running lengthwise 13½″ long near center.

Cover bottom with ¼″ boards.

V. Basement:

1. Excavation.
   Give the cost at 50 cents per cubic yard of excavation for cellar 28′×38′×4½′. Amount of earth removed and what it would be worth if sold.
2. Foundation. Number of cubic feet of concrete in a 9″ wall 4½′ high for house 28′×38′ outside.
3. Cross wall in cellar.
   How many cubic feet in 9″ cross wall 7′ high, one being 26½′ long and the other 13½′ long, allowing for two doorways 3′ wide and 6′ 6″ high?
4. How many cubic yards in all the walls?
5. How many cubic yards in the 3″ floor of basement 26½′×36½′, allowing for two 9″ cross walls, one 26½′ long and the other 13½′?
6. How much gravel will it take for the entire wall and floor?
7. How many sacks of cement for wall, the cement adding nothing to bulk, if three sacks to the yard are needed?
8. Cost of concrete floor and concrete walls when gravel costs $1.70 per yard delivered, and cement costs $2.40 per sack delivered, and it takes five men two eight-hour days at 80 cents per hour to complete it.

9. How many bricks in a 9″ wall 30″ above ground allowing for eight cellar windows $2\frac{1}{2}'$ by 3′, there being twenty-two bricks to the cubic foot? Also give cost of brick wall counting it 10 per cent more per cubic foot of wall than concrete.
10. Find the number of board feet in two 6″×10″ beams used for the ends of joists to rest on, near the middle of basement, one being 13′1″ long and the other 12′ long.
11. How much 2″ lumber for eight cellar windows, frames 8″ wide and 12″ long?
12. Figure the cost of two beams and the cellar window frames at $80 per M.
13. Total cost of entire basement made ready for floor.
    a. Excavation.
    b. Concrete.
    c. Brick.
    d. Window frames and two beams.

(The above includes the best of material, extra strong wall, and union labor wages.)

Construction of Joists, Rough Floor, and Cellar Steps

1. One row of 2×10 joists is 13′ $1\frac{1}{4}$″ long. The other row is 14′ $7\frac{1}{4}$″. How many in each row if they are 16″ apart and if one extra one is used for one end?

2. If 2×10's are spiked on ends of joists how many of them 16′ long are needed?

3. Material for joists $\frac{1}{4}$″×$\frac{7}{8}$″.
4. Give cost of joists and steps at $80 per M.
5. Lay rough floor cornerwise of $\frac{1}{4}$″ material.
6. What is the cost of the rough floor at $40 per M.
7. Cost of joists, rough floor, and steps (without labor) is?

Studding on Main Floor

1. Studding for all room walls.
   55—2×4—18′ long for outside walls.
   45—2×4—18′ long for partitions.
   22—2×4—18′ long for plate and under piece.
2. Cost of above at $60 per M.

Sheeting for House

1. How much ship-lap for sheeting the outside of building, allowing nothing for waste in windows and doors?

Cost of ship-lap at $80 per M?

Find cost of flooring for two floors at $90 per M, adding $\frac{1}{5}$ for waste and matching.

Stairs

1. How many steps will it take with an 8″ rise to reach the top floor 10′ above the bottom floor?

2. How many treads needed?

3. Considering 200 board feet in stairs, averaging $100 per M, what will they cost?

Rafters

1. Find length of long rafter, peak being 18′ above plate and front of porch 29′ from a point beneath peak and allowing 2′ for tail at lower end of rafter.

2. Find cost of long rafters using seventy-four 2″×6″—18′ long at $80 per M.

3. Find cost of roof boards at $60 per M, adding $\frac{1}{6}$ for waste and dormer roof, the boards to run out 2′ over the gables.

In carrying the project to completion, problems arose in manual training, arithmetic, and domestic art.

Study of Pastoral People and Wool.[1]

Teacher's Purpose. — To teach the children to appreciate and understand some phases of their own life and experience through teaching them the life of the Hebrew people as a type of shepherds.

Development. — The first step which led to the development of this project was the making of a wool mat, an industrial art problem. This mat naturally led to the question: "Where do we get the wool for making our mats?" The children had learned in lower grades that wool came from sheep and so we began discussing sheep — their care, etc.

A collection of pictures was then made by the children and carefully examined and discussed by the class. We have a lantern in our building and I was fortunate enough to secure slides representing shepherd life and the Hebrew people. The children now knew that the Hebrews were a pastoral people and so the story of Joseph was read to them and later retold by them. The Twenty-third Psalm was also memorized.

Having become very much interested in sheep and shepherd life, a trip was made to a small sheep farm near by. Here much was learned about the habits, food, care, and shearing of sheep, and the price of wool.

A pelt was secured and was sheared by hand by the children. We discussed this method of shearing by hand and also the method used to-day, which was

[1] A project reported by Emma Johnson, teacher of third grade, O. F. Barbour School, Rockford, Illinois.

demonstrated on our visit to the farm. Pans of warm water and soap were provided and each child washed some dirty, greasy wool. Then a discussion took place concerning the effects of hot and hard water on wool and woolen fabrics.

The children now saw that the men in the factory must have some machine with which to straighten the fibers. We were not able to secure cards strong enough to card our wool, so when our spinning wheel was secured, the class readily saw that a smooth, even yarn could not be spun. They then saw the importance of cards.

Becoming interested in the modern factory method of carding, spinning, and weaving, Miss Sheldon accompanied us to the woolen mill where we had a chance to see all the processes by machine.

This project carried the work of the grade into the following subjects:

I. *Construction and Design.* — The project centered on the making of a wool book, sewed and designed by the class and containing pictures of shepherd life; samples of unwashed and washed wool; wool carded and spun by machinery; written stories on trips, shearing, and washing of wool. Mauve's pictures were studied in the art appreciation class.

II. *Language.* — In addition to the written language mentioned above, the story of Joseph was retold and dramatized, and letters of thanks were written to guides in places we visited.

III. *Spelling.*— Study of words needed in written description.

IV. *Arithmetic.* — Problems based on manufactured goods, raw wool, etc.

V. *Music.* — Gaynor songs about "wool."

VI. *Handwork.* — Sand-table representation of Joseph.

Summary

A careful study of the projects cited in this chapter is sufficient to show the great interest that may be aroused by this method, and that it is possible to teach, at least certain units of the elementary and high school subjects, by the project method. No attempt has been made in this book to organize a subject for teaching, completely on the project basis.

Before the teacher attempts to teach a subject by this method, certain suggestions should be considered. The teacher should, first of all, survey the subject planned for teaching in order to enumerate all the facts, principles, and processes which are to be taught. This material should be arranged in a logical or systematic order. Then the projects which the teacher expects to use in this subject should be outlined to see how much of the material, logically arranged, will be taken care of by these projects.

It is probable that many facts, principles, and processes which should be taught are not provided for in these projects. Projects should be developed for these items of knowledge. If it is found difficult to

provide projects for these facts, or if the project method seems to be uneconomical, then the problem method or the method of presenting the material systematically should be utilized. There should be a sufficient number of projects emphasizing the same facts to provide for habits and skills.

After the facts have been introduced and taught by the project method, the material should be arranged in a logical order and drilled upon until a systematic grasp of the subject is realized.

It must be borne in mind that the writer does not advocate that all the material in a given subject should be taught by the project method. At times it may be uneconomical to use the project. The writer does maintain that the project method is a very effective method of teaching and should be used extensively.

A conscious effort has been made in methods of teaching to find a unit of teaching or a method of teaching which will help bridge the gap between school tasks and tasks carried on outside the school. An effort has been made to find a unit which will combine the good features of home education with the good features of school education. The project as a unit of teaching seems to meet this need, for it provides for learning in its natural setting.

The project aims to present problems in situations not essentially different from those of life outside the school, and to develop the technique of carrying the act to completion.

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